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PSEUDONYMOUS PRINTERS.

Imprimeurs Imaginaires et Libraires Supposés. Etude Bibliographique. Par Gustave Brunet. (Paris, Tross.)

THE bibliography of Pseudonymous and Anonymous publications is a very extensive and intricate district of literature. It has been divided and classified by a German, Emil Weller, in a volume, the last supplement of which appeared in 1862, which, to the uninitiated, presents little more than a dry catalogue of names. First we have "Detected Pseudonyms," a list occupying 160 pages, then "Undetected Pseudonyms" of authors alone. The second division consists of "The False and Fictitious Printing-places, a Dictionary of all writings which have been published by false [or imaginary] Firms." These are arranged by Weller in chronological order. All his research has failed to find above one instance, and that more than doubtful, previous to the year 1512. M. Brunet has selected this branch of pseudonymous literature for a separate work. He boasts to be the first in the field, though he acknowledges M. Weller's labours. We can scarcely understand the claim. M. Brunet arranges his firms alphabetically, a plan which has many advantages, and as he has confined himself mostly to French books, no doubt his catalogue is far more perfect as far as it goes. But this has nothing to do with the question of priority, which, indeed, is scarce worth discussing, because all must yield in turn to Vincentius Placcius, whose little tract "*Syntagma de scriptis et scriptoribus anonymis atque pseudonymis*" appeared in 1674. He and the more famous Fabricius confined themselves naturally to Latin books, the German vernacular being then held in the greatest contempt. In 1690 a Frenchman Adr. Baillet issued his "Auteurs deguisez sous des noms étrangers," and these two are recognized by Weller as the real founders of all similar collections. He enumerates their principal followers, and decides upon following the system of Lancetti, whilst pointing out his gross typographical errors, so all-important in a work of this kind. This consists simply in placing the true names side by side with the false. But the idea of a separate catalogue of the "Fictitious Printing-Firms" seems to have occurred to no one before Weller, and as besides this he has published still more recently, in 1864, a "Dictionnaire des Ouvrages *Francais* portant de fausses indications de lieux d'impression et des imprimeurs," we are surprised to find M. Brunet putting in even a word for the honour, qualified though it be with "nous le croyons du moins."

The purpose of this special kind of pious fraud is obvious enough. Printers and publishers at first were one. And even now both are compelled to a publicity from which authors are exempt, and are held liable in the first instance for the libellous matter which they give to the world, frequently without any exercise of their own volition. And for this reason the invention of fictitious firms is a kind of pleasant forgery which has almost died out. But things were very different in the fifteenth century. Many of the early printers were authors also, and religious zeal punished the hand as well as the head with the extreme penalty of the law. Hence a great impetus was given to these pious frauds by the circumstances of the early partizans of the Reformation, who wished to direct the new engine of liberty against Rome. The object being merely concealment, the opportunity for a sort of canting wit, to borrow a term from heraldry, which the practice of inventing a fictitious firm and place might sometimes have afforded, was not often grasped. To put "Rome" on the date of a religious satire instead of "Wittenberg" satisfied the grim Lutheran. Rabelais, with his "Grensing im Gänsserich," is apparently the first to show the way to such places as Cosmopolis or Veritopolis; though after all these are scarce so laughable as the Nephelococcygia of Aristophanes or the City of Lanterns of Lucian. With the establishment of the new faith within fixed limits, these satires lost their point. The Pope and the monks were allowed a respite, or only attacked in grave and well-advertised volumes. A very different power became the object of attack. In the seventeenth century, Louis XIV. offended and alarmed all Europe, and his politics and his amours were fair game. The presses of Holland and Belgium teemed with little duodecimos, elegantly bound and printed in a manner worthy of the Elzevirs, if that prelotic family did not actually condescend to their production themselves. The great Louis did not, like his great-grandson, allow his despotism to be tempered with epigrams. "The apparition of Scarron to Madame de Maintenon," printed nominally at Cologne in 1694, was exorcised with blood. A journeyman 'prentice and bookbinder were tortured and hung for their share in such ill-advised witchcraft. Two more were sent to the galleys. A fifth was only saved from the gibbet by the special favour of the King's confessor. Greater offenders would have fared no better if they could have been caught. The pen of the Baron de Lisola was dreaded in France. Louvois once wrote to a French Marshal to say, "it would be a great thing to take De Lisola, and no particular disadvantage to kill him." Still earlier, when Francis Hotman wrote a few leaves against the Guises, in a "Letter to the Tiger of France," the printer, Martin L'Hommet, *pauperculus librarius*, was hung as soon as found, the indictment, dated July 13, 1560, reduplicating his offence in good legal phraseology by calling his sheet "Epistles, books, and diffamatory cartels, full of sedition, schism, and scandal." But the tragedy did not end here. The mob took part against the sufferer. A merchant of Rouen, a respectable man, exclaimed, "Surely, death is punishment enough. Let the hangman do his part." He was carried before the judge, and, without any further trial, ordered to be "strangled on the very same spot the printer had suffered." Another satirist was more fortunate. Morlet had written or printed a pasquinade against Anne of Austria called "*La Custode de la royne qui dit tout.*" But on this occasion, the mob was with him, and delivered him at the gallows' foot. For more than a century "Peter Hammer," of Cologne, bore the dangerous honour of typographer to many books of this class. Probably this was a kind of ensign to indicate by a sort of irony that his books were above all others such as would never be knocked down publicly by an auctioneer. Under his name went forth that rare pamphlet, "The Royal Divorce; or, the Civil War in the Family of the Great Alcander," where the two demi-queens, Mmes de Montespan and de Maintenon fight their battles again. He also was entrusted with "The Reciprocal Confession of Louis XIV. and Pére la Chaise: a Dialogue." Sometimes satire was dropped: "France Ruined under the Reign of Louis XIV., by Bois Guilbert," appeared in many shapes. Then we have "The Moral Thoughts of Louis XIV.," "The Tomb of the Loves of Louis the Great," "The Great Alcander Thwarted," The Pest of Mankind; or, the Life of Julian the Apostate," which has been attributed to Jurieu, and rarest of all Peter Hammer's broadsides, "History of the Amorous Intrigues of P. Peters, Confessor of James II." "The Story of the Love of the Emperor of Morocco for the Princesse de Conti," appears to have had some real foundation in fact, and may be compared to the offer of his hand lately made by Theodore of Abyssinia to the Queen of England. "Peter" could not always protect his customers. A Frenchman, who was imprudent enough to write "Annals of the Court and Paris for the Year 1697 and 1698," was discovered, and passed nine years in the Bastile. The same hand wrote "Memoirs of M. D'Artagnan." Did Alexandre Dumas borrow from this in his splendid novel of the "Trois Mousquetaires?" It is said that even Frederic II. of Prussia did not disdain to screen himself under the shadow of Peter. At least, the little pamphlet of twenty-nine pages, called "Account of Phihuhu, Emissary of the Emperor of China for Europe, translated from the Chinese," has been ascribed to him. "Peter's" press is not even yet worn out. His last effort was a "Don Juan," in 1834.

It was under a pseudonymous printer, "Jean Nourse," that La Mettrie's works were published, and the same had the honour of standing typographical godfather to Montesquieu; Le Sage brought here his "Devil on Two Sticks," and here was printed the first French translation of "Tom Jones." Rétif de la Bretonne was obliged to send to "Jean Nourse" his second edition of "Le Pornographe," of which, he said, only three or four heads in Paris were clever enough to see the point. At last, "Jean Nourse" was promoted, "Où? Chez le grand *Editeur*, Jean Nourse," is the imprint to "La Belle Berruyère," in 1764. Under a false name, "Waudret (Veuve)," Daniel Elzevir issued one of his very best specimens of typography, for all his skill and taste would not have propitiated the Society in favour of any one who set up in type "The Morality of the Jesuits, faithfully extracted from their Books." Some of these satires may afford real information to the historian, but the wheat would scarce repay the vigorous use of the flail which would be necessary, and the titles collected by M. Brunet do not impress us with any great idea of the wit of the contents. Voltaire, however, disdained not to rifle them, if we may judge from "*Akakias* (*André*) La Sainte Agonomachie, ou le Saint Celibat Combattu-Cosmopolis. (Hollande). 1675." This book may have assisted him in more ways than one, for it treats of a vow of chastity made by one Popion and his wife. Did he get any hints from it for *La Pucelle*; and was Gibbon aware of it when he launched his irony against a particular kind of martyrdom? One touch of wit escaped Voltaire. None of his impieties are dated from the Vatican press, or bear the authoritative license of the College of the Propaganda.

Occasionally, as Goethe says in his auto biography of certain ladies, books are better than their reputation. "Pollissoniana" or "Blackguardisms" is not a drawing-room title; yet it is said to be not only one of the best, but one of the most innocent jest-books going, and a small impression of 110 copies was reprinted at Brussels so lately as 1863. Another story-book was the solitary performance of Uuriel B—t, and he only printed *seven* copies of that, and even in these the dedication differs. The *Cosmopolite*, as it is called in England, was sold in 1827 for eleven guineas, and in 1834 for twelve, and last year a copy is said to have fetched in France no less than 32*l*. The account given of one successful literary hoax is too good to be omitted. The full title of the book is "Del Collegio Petroniano delle balie latine. . . . Siena, 1719." The author was Jerome Gigli. He begins by stating the Cardinal Petroni had founded a College in the thirteenth century for the purpose of restoring the old Latin language as that of Italy. Many obstacles had prevented up to that time the accomplishment of this project, but they had all now been removed. The Government had given the use of a large mansion; young wet-nurses who spoke nothing but Latin had been selected from Poland and Hungary. They had been engaged for babies of both sexes, and of the first families of Siena. The installation of the College, and the opening of the course, had been celebrated with solemnity. Latin speeches of the managers were given at full length. The world of letters and the public were completely deceived, and great things for a long time were expected from the Latin College of Siena.

With the French Revolution these plea-

santries for the most part came to an end. Amongst the last was a *brochure* dated at Jerusalem, and headed "The Passion and Death of Louis XVI., King of the Jews and the Christians." The engraving represents the king as crucified between a bishop and a noble. It appeared in 1790, and is perhaps one of the most melancholy and accurate prophecies on record. Nor did they revive under Napoleon. The execution of Palm showed his notion of the liberty of the press, and since 1815 authors have not felt the necessity of concealing name, printer, and place. In old days the *Propos de Labienus* would never have been sold publicly even for an hour on the Quai de Notre-Dame. Occasionally the old joke is repeated, and a very late instance (1864 ?) is the imprint on the *recto* of the last sheet of "H.B., by one of the Forty," in Greek. "From the press of the friends of Julian the Apostate, the first year of the 658th Olympiad, on the anniversary of the birth of Lucian of Samosata." The first edition of "H.B." consisted of only fifteen copies, and dates from Eleutheropolis. It is said to be really by a member of the Academy, and a senator.

A list given of anonymous or pseudonymous books printed out of France is of course much shorter, nor does England seem to have been prolific in these curiosities of literature. But we are not without our own publishers of "curious books. Here is a field quite as original as that of "Sign-boards." It affords scope for unlimited anecdote, and perhaps even too tempting a chance for scandal and back-stairs history. Let us hope it may be taken up by a firm yet delicate hand.

DAYS OF YORE.

Days of Yore. By Sarah Tytler, Author of "Citoyenne Jacqueline." 2 Vols. (Strahan, London and New York. 1866.)

MISS TYTLER has now given to the public, in two volumes, under the title of "Days of Yore," a score of exceedingly interesting and well-written tales ; and let him open the book where he will, the reader is sure to be both edified and amused. Miss Tytler has been happy in the selection of all her stories ; and whether touching on the early History of Scotland, or crossing the Channel to Holland, in her story of the "Days of the Dutch Fair," in her pictures of last century or her stories of this, there is always something new, and the characters are so well portrayed, and such clear representations of people and things set forth, that we close the book with a regret that there are not two other volumes left to peruse.

Here, there is no long and troublesome preface, which some never read, and others only glance over, and of which a certain clever author says, "The Preface to a book is what the beard is to an oyster—an uncomfortable, indigestible appendage, which we either reject altogether, or else find the greatest difficulty in swallowing, but without which both book and oyster would be deemed incomplete." We cannot agree with the latter sentiment, for there is nothing unfinished or incomplete in the "Days of Yore," though without preface. We are introduced to the opening story of "St. Margaret," and without any stretch of imagination, we are carried back to the early history of Scotland under Malcolm—the same Malcolm who fled thirteen good years before the opening of the story from the cruel pursuit of Macbeth, his father's murderer. But what a contrast betwen the young lad, dazed and demented by so tragic and horrible an event, and this big-mature Cean-Mohr, who would flee from no earthly evil, and who leans upon naught but his own good sword and his God, and whose face bears the impress of strength, courage, and nobility !

Seldom have we an instance of so great and good a Queen and a woman as this same St. Margaret, and if ever a woman deserved to be worshipped as a saint, it was her. Her whole life is spent in works of piety and of labour, and is a practical instance of the power of a woman's influence, when that influence is guided by love and religion.

Our authoress seems to have been everywhere and seen everything. Verily, she must be the possessor of the Elixir of Life, and have lived in the different periods from which the subjects of her tales are chosen. She is quite a contrast to "L'homme blasé," who says of everything "There is nothing in it." The scenes of the majority of the stories are laid on Scottish ground ; but then the period ranges from the earliest times to the present, and the ground is exceedingly fertile. Under the title of "Insulated," we have an amusing story of an unhappy couple, who, during a quarrel that has lasted a little while, are, by the advance of the tide on some unfrequented part of the coast cut, off from communication with the town, and by this means are brought into close contact with each other, and the result of which, in the Indian language, is "burying the hatchet ;" whereas, if they had not been so circumstanced, they would have never, perhaps, had the opportunity of explaining, and, instead of a happy, they would have dragged out a miserable existence ; for is not life without love loneliness and sorrow ?

The story entitled "The Days of the Dutch Fair" introduces us to the old-fashioned town of Rotterdam, where we find ourselves on the eve of the great Kermis, the fair of the country, in description of which we cannot do better than quote the authoress :—

> It was in the good days of Holland's prosperity, ere yet England had outstripped her in commerce, and after her own greatest troubles were over. The red caps of the Hooks and the grey caps of the Kabbeljaws were doffed in peace ; the Gueux had cast aside their wallets and wooden drinking-cups ; and the Stadtholder was firmly established. There she lay, that paradox of a country, without hill or rock, yet very dear to the painter's heart. Our hankerings after her green sluggish canals, her Paul Potter cattle, her windmills, her masts of ships actually interlaced with branches of trees on her yellow brick quays, bear witness to this. Her portly "purple-fleshed" burghers, with their banner of trade, and their brave resistance to Alva and Louis XIV., have made a place in our hearts. Familiar to us are her women, with their fair apple-blossom complexions and luxuriant flaxen hair ; their round softness in youth and their solid square proportions in age ; their absence of all hair under their ugly linen caps, and their mottled cheeks supply models to generations of painters for old women knitting, old women peeling onions, old women with spectacles and with hymn-books, such as, with song-books and Bibles, formed their libraries. There is a very fascination in those old Dutch women ; in spite of their overgrown bulk and their wrinkled harshness of physiognomy, one loves their honest, sagacious, sometimes careworn faces. Yes, indeed, one hankers also after the drinkers of Teniers, the dashing riders of Wouvermans, the boors' wives and children of Van Ostade, simply because of their common humanity. That Holland of a century ago—made up of flats and dykes, floating vessels and stationary wooden houses, and with its blunt buyers and sellers—had its quaint, luxurious, ineffable charm.

However, with all its fascinations, we must flee from Rotterdam, and to our story. It was in the days of the Kermis, and a great affair was this to the merchant Adrian Vanstraelen, with whose only child, Veronica, we have more business than with Rotterdam and the past time. Now Veronica was destined by her father to be the bride of one Mauritz Heemkirk—a very good match in its way; but as the lady was not consulted at all in the matter, and "hear and obey" seemed the order of the period, it can hardly be wondered at that Veronica was not duly impressed with the honour and happiness of such an alliance. On first sight Mauritz appears to the mind of Veronica not at all to correspond with her ideas of a husband, and she therefore takes a violent dislike to him. But there is a something to be both loved and admired beneath the rough exterior of Mauritz ; and when the burgomasters, sitting in solemn council in the Stadthaus, had almost decided upon an order which would hamper all foreign speculation in the Rotterdam Kermis, Mauritz, notwithstanding his youth, is chosen as the mouthpiece of the people, and bravely he conducts the cause with which he is entrusted, and his exertions are crowned with success, and the order is rescinded. By-and-bye Veronica's ideas change in regard to Mauritz, and an alliance with him does not appear the odious thing it once did, and Mauritz, by his manly bearing and intrepid conduct, has proved to his Veronica that he is worthy to be her husband.

BUDDHISM.

Legends and Theories of the Buddhists Compared with History and Science. By R. Spence Hardy, Hon. M.R.A.S., Author of "Eastern Buddhism, Monachism," &c. (Williams & Norgate.)

UNTIL very recently the name of Gótama Buddha, and the distinctive system of belief which bears his name, were very obscurely known to our historic literature of faiths. And accordingly we welcome the appearance of such books as the one now under consideration as evidencing the gradual decrease of ignorance respecting a religion which absolutely rules all thought in Tibet, Nepal, Siam, Burmah, Japan and South Ceylon, and which, even in exclusive China, has attained a position ostensibly equal to that occupied by Confucianism and Tauism. Great discussion prevails among Buddha's followers as to the precise time of his birth ; one section claiming a period many centuries earlier than the date advocated by the other. The main facts of his life, however, are agreed upon, and constitute a most charming and thoroughly human picture. We wish Mr. Hardy had devoted a greater portion of his book to this subject, as a full examination of Gótama's life, and the tendencies of thought which were generated by it, would have afforded a most valuable help in the elucidation of his enounced doctrines. We find a boy born amid the splendours of an Eastern Court, with every inducement studiously presented for the purpose of diverting his mind from serious subjects, and confining him to the revelries of a luxurious life. The boy's mind, however, as it matures, escapes from the controlment of sensual pleasures, and speculates on those profound questions of human life and destiny which have ever obtruded themselves, with all their awful perplexity, before thoughtful minds. He finds that the highest good is not to be sought for in his present pursuits, and that for the soul some nobler employment was intended than the debasing pleasures of a Court. Impressed by these beliefs, he resolutely abandons home and kindred, and seeks the solitariness and quietness of nature. He wanders about, beseeching alms, has fights with ghostly enemies, lives a truly modest and humble life, ever seeking after the Supreme Wisdom with intensest desire. A troop of demons, sent by the Evil One, attempt to destroy him, but the solitary man, strong in holiness, puts them to the rout, and thence enters into the higher and clearer life. Knowledge now becomes intuition, and superhuman power and insight are believed to have been bestowed as prerogatives upon him. He begins to unfold the noble mission with which he is entrusted, promulgates a new and most pure system of life, utterly opposed to the life that was then believed in, and to the life he had previously led. He returns to the kingdom where he was once the chief, and gradually, after opposition, as was natural, he converts his relatives and the other nobles to the adoption of his creed. Then, after a few more toilful years, this stern teacher of noble faith is taken to his rest, leaving to be treasured up evermore by his disciples, whose name is legion, a life of the most touching kindness, purest morality, and most thorough humanness, that can be lived by man.

Mr. Hardy then details the astronomy, geography, and physical system generally of the Buddhists, and gives us a brief insight

into the views they entertained on the subject of ontology. These are worthy additions to our history of human speculation. The Buddhist, like all other religions of nature, is one in which notions of the superhuman and divine are inextricably interwoven with the objective facts of the material universe; where sometimes the celestial idea is modified by the exigencies of a physical fact, and sometimes the physical fact is influenced by the necessities of some peculiar idea respecting the unknown. And when a national religion is of this complex order, it is useless to present its adherents with the cumulative results of a sound and rigorous science, if at the same time we do not present them with a religious substitute for their faith whose doctrines and elements are not grounded upon physical realities and limited by them. Thus the Greeks for a lengthened period endeavoured to withstand the resistless march of scientific discoveries, because these revolutions, by displacing the physical facts with which their religion was blended, by showing they had no actual existence, or by reducing them to their real nature, dislodged at the same time the deities which were supposed to reside in them, and to be the cause of their manifestation.

Great care has evidently been bestowed in obtaining correct information respecting the Buddhist system of physics and metaphysics, and several chapters are appended proving the erroneousness of these notions by the application of the conclusions of modern science. As the first edition of the book appeared at Ceylon, and was intended for the convincement of the priests, these refutatory chapters were necessary enough; but now that the book is presented to an English public, and the same need for the retention of these chapters is no longer existent, we think their insertion might well have been spared. Had Mr. Hardy removed them, and substituted a fuller narrative of Buddha's life from original sources, and given us a more detailed statement of the doctrines of his disciples, his book would have been more worthy of a place among our manuals of creeds.

MISS BRADDON'S FIRST NOVEL.

The Trail of the Serpent. By Miss Braddon. 1 Vol., cr. 8vo, 6*s*. (Ward, Lock, & Tyler.)

IT is an interesting study, that of pursuing the career of popular authors, and of tracing the steps by which they have arrived at fame. "A lucky hit" disappointed writers term the success of a rival, as if they could add to their own reputation by disparaging that of others. Yet there is certainly some truth in the remark, although invidiously made by those who have not yet hit the right vein. Merit is not always the standard by which works are tested or succeed. Yet it would be idle to deny some sort of excellence to what commands a ready sale. Critics are apt to put their standard of value too high, forgetting that the world has not yet attained, as they have done, that altitude of intellect at which everything appears barren. Their delicate acumen, their impartial decision, above all, the tender spirit in which they hint at blemishes in a composition—a spirit so vastly superior to the mean desire of praising what is good, which of all their gifts is alone within the reach of inferior minds—who does not admire? The world has sometimes the audacity to judge for itself, and then it is worth while to notice the ease with which a first-rate critic can overrule a prior decision, albeit his own.

"The Trail of the Serpent," as Miss Braddon's first essay at novel-writing, has just the blemishes, not without her peculiar excellencies, incidental to all probationary efforts. Novelists and sermon-writers endeavour, the one to astonish, the other to convert the public at a blow. Four murders in one tale, three of these the work of, the other suggested by, the same person, ought to satisfy any reader, unless possessed of a morbid appetite for horrors. The hero of this story is a compound of Eugene Aram and the Count of Monte Christo—like Bulwer's villain in the neatness of his reasoning about removing obstacles from his path, equal to Dumas in his power of suggesting ways of murdering to others.

Jabez North, a foundling, is usher at a private school, much respected by the inhabitants of his native town, because they consider that he does them credit for their kindness in supporting him. He is a fearful hypocrite, without either heart or conscience to impede his rise in life.

Early in the book we are made acquainted with his propensities. He murders a nabob in hope of getting his spare cash. Foiled in his desire of plunder, he poisons a sick boy who slept in his bedroom, for fear of his telling that he had seen him leave the room by the window and return again by the same way. Jabez is instrumental in the death of his twin brother, whose corpse he causes to be exposed for his own, with a bottle of poison in its grasp, and a letter in the pocket of the dress suggesting a love affair as the cause of his suicide. This he does because he has committed forgery. Jabez appears next in France, where he manages to turn a secret marriage between a Mademoiselle de Cevennes and a celebrated tenor singer at the opera to his own advantage. He obtains admission to the lady's house, and tells her that her lover is false to her; and by means of a clever mimic, who imitates the voice and manner of the tenor, Gaston de Lancey, in a well-got-up love scene with another woman, he persuades Mademoiselle de Cevennes of the truth of his statement, and also to poison her lover at their next interview. Jabez now insists on the lady's marrying himself, in order that he may get hold of her wealth. This she does on condition of their living apart from the hour of the ceremony. We must now return to the murder of the nabob, who was on a visit to a sister, Mrs. Marwood. Richard Marwood, otherwise "Dare-devil Dick," the son of Mrs. Marwood, happens at this juncture to come home to see his mother. On professing to amend his ways, his uncle the nabob presents him with all the cash he has in the house, and recommends him to a berth in the office of an old friend, to whom he gives him a letter. Richard starts early next morning, and is pursued and apprehended for the murder of his uncle. Everything goes against Dare-devil Dick. He is tried, and only escapes being hung by being found insane. A dumb detective, "Peters," is doubtful of Marwood's guilt, and determines to hunt down the real criminal. Marwood escapes from an asylum by aid of some confederates, and goes to London. Peters discovers Jabez under his disguise of the Count de Marolles; and, in short, brings him to his trial as the murderer of the nabob. Jabez is convicted, and finally commits suicide by means of a delicate lancet contained in a gold ring, with which he bleeds himself to death.

"The Trail of the Serpent" is very smartly written; the invention of the writer never fails, and the interest of the reader, consequently, is never permitted to flag for a moment. Miss Braddon is particularly happy in her dialogues, and manages to seize every opening presented to her for heightening the colour of the story in the most dramatic manner. We are reminded, for instance, that the clerk who telegraphs the description of the murderer works the telegraph as if he were "*playing a piano.*" With all these sensational accessories, there is a great deal of very clever coining of characters. The operation is the only one which occurs at the moment as a means of describing Miss Braddon's style and brilliant manner. The machine is put in motion, and out comes a well-executed likeness, obverse, legend, and all, bright, clean, with a neatly-milled edge; and hundreds will ever be ready to purchase her works for the ability with which they are struck, if not for their intrinsic merit.

VERSIONS OLD AND NEW.

A Plea for a New Translation of the Scriptures, with a Translation of St. Paul's Epistle to the Romans. By the Rev. Alfred Dewes, M.A. (London: Longmans, Green, & Co. 1866.)

THERE are many social abuses which, from some cause or other, resist every attempt to get rid of them. Whether it is that age gives them license, or that habit has so blinded those who come in contact with them that they are hardly observed, it cannot be denied that the most absurd and monstrous things are done and repeated day after day, in the face even of occasional strong opposition. The character which the Englishman has gained of being excessively obstinate, has doubtless arisen from his dislike of the trouble attending change; and it is owing to this dislike that it is so difficult to persuade him to remedy the social evils which surround him. It is a great point to get an Englishman to see that anything to which he has been long accustomed is an evil; but, that being accomplished, it might be thought that some attempt would be made to remedy it. Not so, however. Another ingredient besides mere "abuse" must be added before an Englishman will interfere, and it is the potent one of an attack on his purse, or an interference with his rights or general well-being.

It is not to the mere physical evils of social life only so much tolerance is shown. What has been said is equally true of moral or religious abuses, and of none more so than of that to which the book now before us refers. The desirability of a revision of the Authorized Translation of the Scriptures may be said to be established, seeing that the almost unanimous testimony of everybody who has taken the trouble to think about it is declared in its favour. Nearly every writer who refers to the subject admits that there are numerous mistakes in the received version. Every Commentary on the Scriptures, every new translation, and every aid to the understanding of them, are acknowledgments of the unsatisfactory nature of the received version. Those who are the loudest in its praise often make acknowledgments as to its inaccuracy which go far towards neutralizing the praise they give. Bishop Ellicott, for instance, calls the Authorized Scriptures "our own old version," and asserts that it is "the best translation in the world;" and yet he acknowledges that it is "incorrect, inexact, insufficient, and obscure," and that it needs 252 corrections in the short Epistle of St. Paul to the Galatians alone, which contains only 149 verses.

If it were only one school of critics who found these imperfections, it would not be surprising that their representations should be without much effect; but when we find all classes agree, not only in the *general* inaccuracy of the Authorized Translation of the Scriptures, but also in that of particular passages, it seems unaccountable that steps are not taken to remedy the acknowledged evil. A partial explanation of this apparent inconsistency is perhaps found in the fact that there *are* several classes interested in the proposed revision. Doubtless, each of them is careful only for the "truth," but unfortunately the human mind has a curious habit of judging of truth by the light of prejudice. The same argument which has been used against a revision of the Book of Common Prayer is equally good against interfering with the Authorized Version of the Scriptures. Those passages which are supposed to countenance the cherished opinions of one party cannot be altered, however absurd or inaccurate may be their rendering, without the most violent opposition; and as every party in the Church, leaving out of sight the Dissenters, claims a number of passages of this description, it is evident, either that a re-translation can only be obtained at the cost of a vast amount of disputation and ill-feeling, or that, when completed, it would not repay the trouble spent over it, as the most serious errors will have been, by way of compromise, left un-

touched. While, therefore, it is agreed on all hands that a re-translation of the Scriptures are required, the practical difficulties in the way of carrying it out are almost insuperable, and we think our author does not lay sufficient stress on these difficulties. Nor, although he finds fault with the attempts of such men as Bishop Ellicott, Professor Jowett, and Dean Alford, does our author seem to feel sufficiently the difficulty of finding any one competent to the task.

The fact is that the more the subject is considered, the more hopeless does it appear that any satisfactory solution of the difficulty can be found.

One point in favour of the Authorized Version of the Scriptures we think our author has not sufficiently recognized, and it appears to furnish some explanation of the apparent inconsistency between the acknowledgment of the inaccurate rendering of that version and the high praise lavished on it by the same writers. We refer to the fact of its phraseology being mainly Anglo-Saxon. It is this, doubtless, to which Bishop Ellicott refers when he speaks of "our own noble version." It is, indeed, a noble monument of the Anglo-Saxon language, and, as was said some time ago by a noted Roman Catholic divine, it is that which has given it such influence with the English people, and which will render it so difficult to get them to assent to receive another version in its place. However serious are the difficulties we have pointed out in the way of supplanting the received by a fresh translation of the Scriptures, they could nevertheless be surmounted by the exercise of authority, so far at least as the mere substitution of one version for another goes. Neither Parliament nor the Sovereign will, however, of their own accord, exercise this authority, and there seems little chance of any pressure from the people generally being exerted for that object. But to return to the point from which we started: the people generally have got so accustomed to the defects of the Authorized Version, and it so little affects their pockets or general well-being, that as a rule they have the most perfect indifference to any alteration being made in it. Besides which, to have to give up the old translation, the language of which has become a household word, for a new one, with its many fresh ideas, would be an utter impossibility with the bulk of the middle classes, even if their spiritual teachers could be persuaded to accept the loss of many favourite texts which now supply them with arguments in support of their peculiar dogmas. So long as the people generally cannot be made to feel the need of a fresh Authorized Translation of the Scriptures, either by application to their prejudices—which is impossible, seeing that they all lie in the other direction—or by a more material influence, the present received version will not be interfered with. It is a curious fact that it is so, but we fear "human nature" is alone to blame for it. There is one plan still open for those to pursue who wish for a fresh translation which shall have a chance of standing its ground against the received one, and that is, to obtain the withdrawal of the "authorization" of the law; and, as a consequence, the abolition of the monopoly in Bible publishing. If the present version of the Scriptures ceased to be authorized, although there would be little hope of Churchmen and Dissenters all agreeing at first to accept the same revised translation, most probably, the one which retained most completely the old Anglo-Saxon phraseology, while at the same time it gave the common-sense rendering of the words of Scripture would finally, though but gradually, push on one side its competitors and take the place now occupied by that which all parties unite in finding fault with.

We have not space to refer particularly to the rules laid down by our author for observance, if a satisfactory translation of the Scriptures is to be made. They are practically the same as those given by Dr. Kennedy in the preface to his translation of Demosthenes, and they could hardly be improved. Nor are we able to enter into a critical examination of the version of St. Paul's Epistle to the Romans made by our author. We must leave our readers to judge of its value for themselves, and we heartily recommend them, if they take any interest in the question of Bible revision, to study it by the light of the work before us.

LORDS AND LADIES.

Lords and Ladies. By the Author of "Margaret and Her Bridesmaids." 3 Vols., 31*s.* 6*d.* (Hurst & Blackett).

ON opening this novel, we expected an introduction to the most elegant houses, furnished with every luxury, and inhabited by the leaders of the fashionable world; we had also, perhaps, a little misgiving as to the exact amount of scandal about to be exhibited to our virtuous eyes; but we were agreeably disappointed in discovering that nothing of the kind was to be attempted. "Lords and Ladies" is simply an attempt to set before the world in a dramatic shape the relative positions of men and women, husbands and wives. It treats, in short, in a light, unpretending, yet withal telling way, of the great bonds which unite woman to man, as his helpmeet and better half. The story, then, is not about high life, but about life itself. Certain ladies and gentlemen quarrel, and resolve, the ladies by themselves, and the men by themselves, to retreat to two little islands, and see who can do best without assistance of the other sex for one month. The idea is a good one, and amusingly worked out. The ladies would have won easily, but for the violence to which they are subjected by some ruffians, and from which they are saved by the stronger vessel. The chief female character is a noble conception; and the novel, under guise of a comedy, affords a very clever view of the mutual interdependence of men and women. This is managed not in a highflown style, but by means of amusing, yet hitting dialogues and critical situations. The novel is a parable of life, and the author is not ashamed to instruct by giving a merry sermon when she (?) might have given a dismal one. Woman's mission, if we read the parable aright, is to discharge her share of life duties, and, apart from want of bodily strength to resist brute force, she is correctly shown to have the greater share of the duties to fulfil. With regard to the mission of woman, there are two ways of looking at it. The poetic, by which flattery is offered in the shape of incense to an idol, when the worshipper desires to obtain his own ends by his worship. Woman is treated as if she was a beautiful child, with sonnets addressed to her silken tresses, bright eyes, rosy cheeks, and graceful form, and is expected to be led wherever she is required to go. The other ascribes to her her right value, as one who has to bear the chief burden of existence, the mother of all living. It is a mistake to suppose that her due honour has been bestowed upon the woman only in Christian ages. If the *varium et mutabile* was the description accorded by those who only desired to work upon her sensibilities, even in ancient days, still more was the voice of antiquity ever indirectly asserting her glorious position as the mother of the family. Hence, amongst the Hebrews, we find the true appreciation of female power. Amongst the Greeks, even the beauty of her form in sculpture is full of the modesty of her nature. In the Greek poets we have only to recall the name of Antigone; in the best days of Rome that of Cornelia. The noblest things in the ancient life, as now, were seen to be best personified by woman. Cities were Queens ruling over many subjects. She is to us the mystery of our nature: changeable and apparently capricious, but touch the right spring, and she is herself—self-sacrificing, ready for any act of devotedness. The notion set up by certain strong-minded females of woman's rights is simply a surrender of her superiority. She has her rights in her duties and offices, those of charity and affection more particularly her own. The answer of Napoleon to Madame de Stael's inquiry what woman he considered greatest—"Her who has reared the most children"—is, in effect, the whole secret of her influence. This destroys her equality—it does—for it establishes her superiority. Who have been the most heroic of women? Surely such as those mothers of families who have gone to the stake for their convictions. Why does the case of the woman who took her suckling child from her breast before she ascended the scaffold to be executed for stealing an article worth only a few pence, affect us so, but for this feeling of the grandeur of her nature? And why does the crime of child-murder committed by females strike twofold horror into our souls? Because it is an outrage on their very nature. To recover the fallen woman is to revive in her what is most lovely—her purest affections. These must not be tampered with. Instead of treating her as a fair foolish creature, made weak by her own craving for personal admiration, she is to be instructed in her holy office. Instead of lavish compliments to her beauty and her mind, let due acknowledgment be rendered to those who leave a throne to visit a cholera hospital; to those who, endowed with every beauty and natural delicacy, are yet not ashamed to show themselves able to cope with the most distressing battles of existence—contests to which the mere struggles for mastery of warriors are as nothing, so far as endurance and courage are concerned. If man is represented as the Day, well has Michael Angelo represented woman as Night, wrapped in the shadow of her own tender sadness, yet wise as the gods contemplating the starry mysteries of heaven. In "Lords and Ladies" such thoughts as these are brought before our minds, and the book will not be without advantage to those who study its deeper meaning.

Our Postal and Revenue Establishments Considered with a View to Utilizing the Former for the Receipt and Payment of Revenue Moneys, the Granting of Licences, and Sale of Stamps in all Provincial Towns, and to a thorough Amalgamation and Consolidation of the Surveying Branches of these Departments. By a Civil Servant. (Pitman).—Whilst the whole of Germany and Frankfort in particular, is rejoicing over the abolition of the mediæval privileges of the Prince of Thurm and Taxis, and Prussia is about to reorganize the postal department of half-a-continent, we must not suppose that the management of our own Post-Office is incapable of further improvement. The present volume is an attempt to show what great facilities that establishment affords for the receipt and payment of revenue moneys, and for the sale of stamps and the granting of licences. The distribution of stamps alone would be an annual saving of 40,000*l.*, and has been recommended by Sir Rowland Hill, Mr. Charles Pressley, Sir Thomas Fremantle, and Mr. Thomas Dobson. But this is only one item which would accrue to the national benefit, if the whole scheme here contemplated is ever completely carried out. The greater part of the present volume consists of the evidence taken before the Horsfall Committee in 1862 and 1863, of which besides an excellent analysis is given; and the original matter consists of suggestions, every one of which we find from the preface "has received the express sanction and approval of gentlemen of great experience and influential position of both the Revenue departments." The nature of these may be gathered from the title. They all tend to the diminution of expense and the organization of official labour.

Fire Prevention and Fire Extinction. By James Braidwood. With Illustrations, Memoir, and Portrait of the Author. (London: Bell and Daldy, 1866).—Not long ago we reviewed a book bearing a similar title, and written by Mr. Young. If that was a more elaborate performance, this is better written, and likely perhaps to be more popular. The Memoir of James Braidwood at the beginning of this volume is simple and unpretending, but complete, and will, we have no doubt, be interesting to that large class in whose eyes Braidwood was a hero. The body of the book itself is a reprint of part of James Braidwood's own writings;

but an Appendix serves to bring down the information to the present time. As we have very recently entered upon the general question of Fire Brigades and Fire Extinction, we cannot, as we should otherwise have been glad to do, devote a greater space to the work now before us; but we can recommend it as containing hints which may be useful to every householder. The causes of fire are more carefully and more minutely described here than in any book with which we are acquainted.

We have received *Lindisfarn Chase*, by T. A. Trollope. Third Edition. (Chapman and Hall); —*Rachael Ray*, by Anthony Trollope. Eighth Edition. (Chapman and Hall);— *Terrestrial and Cosmical Magnetism: the Adams' Prize Essay for* 1865, by Edward Walker, M.A. (Cambridge, Deighton, Bell, and Co.; London, Bell and Daldy);—*Chronological Synopsis of the Gospels*, by H. Grenville (J. R. Smith);—*The Glorious Gospel Unfolded*, by Henry Webb (Simpkin, Marshall, and Co.);—*The Rubric as to Ornaments of the Church, and of the Ministers Thereof, &c.* Second Edition, with Corrections and Additions. (Parker and Co., Oxford and London); *Godly Meditations upon the Most Holy Sacrament of the Lord's Supper*, by Christopher Sutton, D.D. A New Edition (Parkers, Oxford); being a reprint of that issued in 1838, in a series of Devotional Books printed at Oxford. The title-page is a fac-simile of the Original, which was published at London in 1630, and dedicated "To the two virtuous and modest Gentlewomen, the now Lady Verney, and the Lady Rodney, sisters; sometime attending upon the late Queen in her Honourable Privy Chamber;"—*A Berkshire Village, its History and Antiquities*, by the Rev. L. G. Maine (Parkers.);—*Views and Opinions*, by Matthew Browne (Strahan).

BIBLE STATISTICS.

[I.]

THE TESTIMONY OF JOSEPHUS.

IN the year 71 of the Christian Era Vespasian and his son Titus, with all that pride and pomp which mark Imperial power, led up to the Roman Capitol the triumphal procession which indicated the downfall of the Jewish nation. We learn from Josephus* that, "last of the spoils" which were then, with coarse and unfeeling pride, exhibited to the Roman populace, "was brought the *Law of the Jews.*" Another passage from the autobiography of the same writer tells us that amongst other gifts received from the Emperor were the "Sacred Books," which he chose above all the captive treasures as most likely to console him for the utter destruction of his people. The principal work of Josephus is his "Antiquities of the Jews," wherein he closely copies the Bible narrative, and, as he always quotes his authority under the name of the "Sacred Books," and intimates that his intentions are to inform the heathen world more fully about the history of his countrymen, it is not an unreasonable supposition that the Book of the Old Testament was, until then, generally unknown to the Greeks and Romans. The term *sacred* was applied by the ancients to those books which were kept apart from the public, and known only to the initiated or privileged classes. It is not, indeed, to be denied that at Antioch, Babylon, and Alexandria, where there were large colonies of Jews speaking the Greek tongue, the knowledge of the Jewish sacred volume could scarcely be kept from many strangers with whom the Jewish residents were in daily communication. Moreover, the fact of there having been at least one Greek translation—the Septuagint—current in the countries round Judæa, at or soon after, if not long before, the time of Christ, precludes us from supposing that the *Book of the Law*, as the whole Bible seems to have been called, was confined wholly to the priestly class. But, when we find from a passage in in the poet Juvenal that, even fifty years after the time of Josephus, the Book of Moses is termed the *secret* or *mysterious* volume, we cannot believe that a work so interesting would have remained so little known, unless it were the set design of the priests to keep the knowledge of it to themselves. Such a mode of acting has been found to exist in all countries, ages, and religions; nearly fifteen hundred years passed away before the still more beautiful volume of the New Testament became known to the world at large, and even now it is kept as much as possible, by the priests of the largest section of Christians, from the knowledge of the laity. Nor can it be said that when the Jewish Scriptures fell into the hands of Josephus, they were then free from every hindrance which might impede their circulation. For Josephus, proud of his position at the Roman Court, and ambitious of the honours due to authorship on a new subject, would be little eager to put forward an ancient book, the fame of which might eclipse his own. Nor would he, moreover, be willing to produce as his authority an authentic narrative, from which his own history of the Jews had deviated so signally. It is therefore highly probable that the *Book of the Law*, by which we must understand our present Hebrew Bible, did not gain much publicity in the heathen world by having been consigned by Titus to the care of the Jewish writer Josephus. We may also believe that his own writings were designed quite as much for Jews, speaking the Greek tongue, of whom there were great numbers in the large Grecian cities of Egypt and Asia, as for the heathen world.

Joseph, the son of Mathias, a Jewish priest, was born at Jerusalem in the year of our Lord 37, about six years after Christ's crucifixion. His name Josephus, by which he is usually called, is merely the Latin form of the Hebrew original, and his prænomen, Flavius, was adopted by him late in life in honour of the Flavian family, of which Vespasian, and after him Titus, was the head. The family of Josephus was ancient and distinguished, tracing its origin to the first of the twenty-four old priestly courses, and his mother was lineally descended from the Asmonean princes. Whilst still a child he was remarkable for his wit and understanding; at the age of fourteen he was so fond of letters, that the chief priests meeting at his father's house used to put to him difficult questions about the Jewish law. When he was sixteen years old, he resolved to learn the doctrines and opinions of the three chief sects of the Jews—the Pharisees, the Sadducees, and the Essenes; in order that, by a minute inquiry into the tenets of their philosophy, he might determine which he should himself follow. Having heard that one Banus, an Essene, was living the life of a hermit in the desert, making his raiment from the trees, his food from the fruits of the earth, bathing in cold water at all seasons of the year, and using every kind of mortification to increase his sanctity, Josephus became ambitious of imitating so holy an example, and accordingly joined him in his cell. But when he had spent three years of pain and penance in the wilderness his zeal was tamed, and at the age of nineteen he again entered the busy world, leaving his companion and teacher to aim alone at the rewards of his solitary philosophy. He now joined the Pharisees, in whose doctrines he found plenty of that worldliness which, after all, does less harm to the progress of mankind than the harsh, self-denying asceticism of the Essenes.

In the twenty-ninth year of his age Josephus undertook a voyage to Rome, to make interest in favour of some priests who had been sent thither by Felix to answer some unimportant charge. On this voyage he was shipwrecked, and in great danger of being drowned. Eighty of those who were on board saved their lives by swimming, and were picked up by a ship from Cyrene. On his arrival at Puteoli, the usual landing-place at that time, Josephus made acquaintance with Aliturus, an actor, who was of Jewish birth, and in high credit with the Empress Poppæa. By his intervention Josephus obtained the release of the prisoners, as well as valuable presents from Poppæa, and returned to Judæa. During all this time he had studied carefully and successfully the Greek language, which few of his countrymen could write, and still fewer pronounce correctly. On his return he found his countrymen disposed to revolt against the power of Rome, and after vainly endeavouring to oppose them he joined their cause, and held various commands in their armies. At Jotapata, a small town of Galilee, he showed his military skill by maintaining a siege of forty-seven days against Vespasian and Titus. When the town was at last taken, forty thousand men were put to death, whilst only twelve hundred became prisoners. Josephus, with forty others, saved his life in a cave; all his companions but one killed themselves, to escape falling into the hands of the Romans, but Josephus and that survivor gave themselves up to the Roman general Vespasian, whose favour he soon gained by foretelling that he would one day become master of the Roman Empire. He went with the Romans to besiege Jerusalem, and urged his countrymen to submit to their superior power, but the Jews would not listen to one whom they looked upon as a traitor, and the Roman soldiers also were far from holding him in the same light as he was held by their commanders. As a reward for his adherence to the Roman cause, he was allowed to save more than 200 of his own kinsmen and friends from the lot of slavery, and received a large grant of land from the Emperor. But he lived afterwards mostly at Rome, where he stood in high favour with all the three princes of the Flavian family. He married first a Jewess of Cæsarea, but divorced her, and took to wife a lady of Alexandria, who bore him three sons, one only of whom—Hyrcanus—lived to be a man. Josephus then divorced this wife also, and married a Cretan woman of Jewish birth, of high rank and great wealth.

Whilst living at Rome, Josephus turned his attention to literature, and wrote first a "History of the Jewish War" in the Hebrew tongue, for the use of his own countrymen dispersed throughout the East. He afterwards translated the work into Greek, and in the fifth century it was translated into Latin by Rufinus of Aquileia, or by Cassiodorus. [See Muratori, Antiq. Ital., 3,929.] It was not until A.D. 93 that he published his great work on the "Antiquities of the Jews," in twenty books. This work, following in general the Bible narrative, contains the history of the chosen people from the Creation down to the reign of Nero, when the thread of events is taken up by the "History of the Jewish War," before published, so that the two together give us an unbroken history of the Jews from the creation of the world to the destruction of Jerusalem. The end which Josephus proposed to himself in his longer work was to make his countrymen better known to the Greeks and Romans, and to remove the contempt in which they were generally held by those superior nations. "The Antiquities of the Jews" gives us facts not found in the Bible, and it quotes Eastern writers of whom we otherwise know nothing; but it differs from the Bible in its system of chronology, and also in the remarkable fact that it mostly ignores those miraculous circumstances with which, according to the Bible, all the leading events of Jewish history are clothed. Josephus allows himself the liberty of adding to the recital of an event circumstances which change its entire nature; in every part of the work he represents his countrymen in a point of view likely to conciliate the respect of the Romans; and these are reasons for thinking that the original Hebrew volume of the Old Testament would be withheld by Josephus as much as possible from the knowledge of the heathen public, lest the remarkable divergency between them and his own work should bring discredit on the character of his nation or on the truthfulness of his own delineation of it. Nor is

* De Bello Judaico vii. v. 5. Josephus alone of ancient writers gives us a full account of the Roman Conquest of Judæa. It is much easier to acquiesce in the authenticity of this author's works than to guess by any stretch of the imagination who else could have written them.

it needful, in order to substantiate this opinion, to show that Josephus has wholly set aside the peculiar tenets of the Jews. He has ignored the most striking of their miracles; but he has not ignored their Monotheism, and he would not thereby offend the prejudices of philosophers and of all the educated classes, for no one above the condition of an artizan or a peasant any longer believed in the plurality of gods whose statues adorned the Pantheon in the reigns of the Cæsars. The doubt or disbelief which was falling upon Jupiter, Juno, and Hercules, though it might not promote the worship of Christ and of the Trinity, would undoubtedly stop short of denying the existence of a God. We read in many passages of heathen writers the name of God used in the singular number, and showing that polytheism was going out of fashion, not by a gradual diminution of the number, but by a rejection of the principle of a plurality as contrasted with the simple belief of the one God who made and upholds all things by His supreme power. This is, in fact, the ground which Josephus takes in his works, though the nature of the case would lead him to deviate unwittingly from uniformly and in every instance following the line of argument which he had chalked out. Keeping these things in mind, we may observe that the "Antiquities of the Jews" is a very interesting work—both to compare with the Old Testament and as affording a faithful picture of Jewish manners in the time of the historian himself—whilst it fills up a void in Jewish history during the four centuries which passed between the writings of Malachi and the beginning of the Christian era.

Besides the two long works just named, Josephus wrote an "Answer to Apion," a celebrated grammarian of Egypt who had given currency to many ancient fictions of Egyptian tradition about the Jews and also his own "Life." In the former work we must acquiesce in the statements of Josephus; for the work of his adversary is no longer extant; but we may lament its loss the less from some information about Apion gleaned from other writers. Pliny in one passage of his Natural History refers him to a class of magicians,* and in another† quotes his authority for the existence of a lake in Sicily where nothing sinks, but everything thrown into it floats upon the surface. The same Apion is also named by Aulus Gellius in his amusing work "Noctes Atticæ," as author of a History of all the wonders that have been witnessed in Egypt, apparently from the earliest times. It is to be regretted that Time has not spared us this work; for we might have found in it some notice of facts connected with Jewish history, and might have seen how far Josephus, who extenuated the Jews' miracles, in addressing a people superior to his own, may have resented similar conduct in Apion, who addressed the Egyptians, a nation more on a par with the Hebrews in arts and general civilization.

In his "Life," also, Josephus writes against a literary adversary, Justus of Tiberias, who, like himself, had published a "History of the War," written with much elegance in the Greek language.

PUBLICATIONS OF THE WEEK.

Ahn (Dr. F.). French Commercial Letter-Writer, a complete Series of Letters, Circulars, and Forms, suited to all the Requirements of Trade and Commerce. 12mo, cl., pp. 227. *Trübner.* 4s. 6d.

Atkins (Richard). Hints on the Settlement of Claims for Losses by Fire under Mercantile Policies. Cr. 8vo, cl., pp. 108. *C. and E. Layton.* 5s.

Atlantic Telegraph (The); its History, from the Commencement of the Undertaking in 1854, to the Final Success in 1866. 12mo, sd., pp. 116. *Bacon.* 1s.

Carpenter (J. E.). New Standard Song-Book. 18mo, bds., pp. 275. *Routledge.* 1s.

——— New British Song-Book. 18mo, bds., pp. 275. *Routledge.* 1s.

Cassell's Sixpenny Hand-Books. Hand-Book of Fishing. 18mo, bds., pp. 64. *Cassell and Co.* 6d.

——— Hand-Book of Rowing and Sailing. 18mo, bds., pp. 61. *Cassell and Co.* 6d.

Chapters on Flowers, by Charlotte Elizabeth. Cr. 8vo, cl., pp. 314. *Seeley and Co.* 5s.

Currie (James, A.M.). Rudimentary English Grammar. Constable's Educational Series). 18mo, cl. bd., pp. 62. *T. Laurie* (Edinburgh). 6d.

* Natural History, xxx. 6.

† Natural History, xxxi. 19. See also xxxii. 9; xxxv. 36, 14; xxiv. 102.

Disraeli's (Isaac) Curiosities of Literature. Vol. 2. Cr. 8vo, cl., pp. 546. *Warne.* 3s. 6d.

Ellen French: a Tale for Girls. By Aunt Evergreen. 12mo, cl., pp. 177. *Jarrold and Sons.* 2s.

Ferguson (Robert). America During and After the War. Cr. 8vo, cl., pp. 250. *Longman and Co.* 6s.

Ganot's Elementary Treatise on Physics, Experimental and Applied. For the Use of Colleges and Schools. Translated from the French by E. Atkinson, Ph. D., F.C.S. Illustrated with 620 Woodcuts. Cr. 8vo, cl., pp. 799. *Baillière.* 15s.

Harting (James Edmund). The Birds of Middlesex. A Contribution to the Natural History of the County. Cr. 8vo, cl., pp. xvi.—284. *Van Voorst.* 7s. 6d.

Heffernan (D. E., Civil Engineer). The Tourist's Pictorial Index to the Killarney Lakes and South of Ireland, giving a brief description of all Objects of Interest; how they may be reached, and the way to see them. With a new and beautifully-engraved Plan of the Lake District. Sq. cl., pp. 31. *Simpkin, Marshall, and Co.* 1s. 6d.

——— Dublin at a Glance. A Plan. Cr. 8vo, cloth case. *Heffernan.* 2s. 6d.

——— Killarney at a Glance: being a Pictorial and Descriptive Reference Plan from recent Surveys. Cr. 8vo, cloth case. *Heffernan.* 1s. 6d.

Hill (Georgiana). How to Cook Fish in a Hundred Different Ways. (Household Manuals.) 12mo, sd., pp. 64. *Routledge.* 6d.

Kilvert (Rev. Francis, M.A.). Remains in Verse and Prose, With a Brief Memoir. Cr. 8vo, cl., pp. 198. *Simms* (Bath). *Simpkin, Marshall, and Co.* 12s.

Maxwell (W. H., Esq.). History of the Irish Rebellion in 1798; with Memoirs of the Union, and Emmett's Insurrection in 1803. With Illustrations by George Cruikshank. Cr. 8vo, cl., pp. 477. *Bell and Daldy.* 7s. 6d.

Neale's (Rev. J. M., D.D.). Sequences, Hymns, and other Ecclesiastical Verses. Sm. 4to, cl. pp. viii.—216. *Hayes.* 2s. 6d.

New General Atlas of Modern Geography. 4to, bds. *Oliver and Boyd.* 3s. 6d.

Notes and Expositions. By J. N. D. Cr. 8vo, cl., pp. 184. *Broom.* 2s.

Power (Rev. P. B., M.A.). A Faggot of Stories for Little Folk. 18mo, cl., pp. 166. *M'Intosh.* 1s. 6d.

Procter (Richard A., B.A., F.R.A.S.). The Hand-Book of the Stars; containing the Places of 1,500 Stars, from the First to the Fifth Magnitude inclusive, upwards of 200 of which are Noted as Double, Multiple, or Variable; a List of Star-Names, a Table for Determining the Position of the Constellations on the Celestial Concave at all Hours and Seasons, and other Useful Tables. Illustrated with Maps and Diagrams. Cr. 8vo, cl., pp. 89. *Longmans and Co.* 5s.

Reid (Captain Mayne). Guerilla Chief, and other Tales. With Illustrations. 12mo, cl., pp. 314. *Darton and Co.* 3s. 6d.

Riddell (Mrs. J. H.). The Race for Wealth. A Novel. 3 Vols. Cr. 8vo, cl., pp. 1,058. *Tinsley.* 31s. 6d.

Shakespeare Handy Volume. Vol. 4. 32mo, sd., pp. 306. *Bradbury and Evans.* 1s.

Shew (Joel, M.D.), and Traill (R. T., M.D.). Cholera; its Causes, Prevention, and Simple Treatment. 12mo, sd., pp. 52. *Bacon.* 6d.

Stabat Mater Speciosa. Full of Beauty Stood the Mother. Sq. cl., pp. vi.—31. *Hayes.* 1s.

The Legend of the Wandering Jew. A Series of Twelve Designs, by Gustave Doré, with Explanatory Introduction. Fol. cl. *Cassell and Co.* 15s.

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SCIENCE.

THE BRITISH ASSOCIATION.

Nottingham, Wednesday Evening.

THOSE members of the British Association who fancied that the principal thing to do, in order to attend the meeting, was to get to Nottingham, have by this time been undeceived. If the individuals to whom the arrangements had been entrusted had tried to bother their visitors as much as possible, they could not have made things more confusing. To find the Reception-Room by the aid of the inhabitants was impossible, and it was only by means of wandering from one end of the town to another, and carefully examining all the cross-streets, that this wished-for consummation was attained. Then, at one o'clock the first meeting of the General Committee was announced to take place in the Council Chamber of the Guild-hall. Thither, accordingly, a number of members repaired, but found no meeting there, and no one who could tell them what place had been chosen for it; so there was nothing left but to come back to the Reception-Room and inquire of the officials, by whom we were sent to the Mechanics' Hall, a spacious and convenient building, destined for the meeting of Section E, in which the meeting was held. It is to be hoped that the presence of so many of the distinguished lights of science in Nottingham will tend to brighten up the natives a little, and that on future occasions of this sort they will not be so utterly at their wit's ends as they appear to be at present. We learn that the arrangements for lodgings have been very badly conducted, and that great inconvenience has resulted therefrom. We do not make these remarks in a fault-finding spirit; it is for the interest of the Association itself that defects like these should be pointed out, for it is only by the greatest care in small things, and by the appointment of men who are thoroughly capable of attending to the minutest details, that the comfort and harmony of these large gatherings can be preserved, and that the British Association can hope to preserve that popularity which, in spite of much mismanagement and official indolence, it has hitherto enjoyed.

But to return. After the minutes of the last meeting and the Treasurer's Report had been read and confirmed, and the Council had informed us that Captain Belavenetz, Geheimrath von Dechen, M. Gaudry, Professor Grube, Professor Kiepert, Professor F. Römer, Chev. C. Negri, and Professor Steenstrup, have been added to the list of Corresponding Members, and recommended that the names of Mr. J. Hind, F.R.S., and Mr. T. Close, be added to the list of Vice-Presidents of the meeting, Lord Wrottesley read the Report of the Parliamentary Committee, which was adopted after a short discussion, in which James Heywood, Esq., Sir J. Bowring, Colonel Sykes, M.P., Lord Wrottesley, and the President (Professor Phillips) took part. The report of the Kew Committee was then read by J. P. Gassiot, Esq., F.R.S., and unanimously adopted. The appointment of Dr. Thomas Arthur Hirst as joint General Secretary for the present meeting was proposed by the "senior trustee," Sir R. I. Murchison, and seconded by Mr. Francis Galton, and Dr. Hirst was unanimously elected. After a few remarks by the President, Mr. Crawfurd proposed, and Mr. J. Gwyn Jeffreys seconded, the proposition that Sir Henry Rawlinson be elected a member of the Parliamentary Committee, which was also carried unanimously. The meeting terminated by the reading of lists of the officers and places of meetings of different sections. We noticed that a new section, to be devoted to Biology, was announced to include the "Science of Man;" yet Mr. Crawfurd and his Ethnologists, a rapidly dwindling band, are still part of Section E. If Ethnology is not supposed to be part of the science of man, what do the British Association suppose it to mean? Perhaps Mr. Francis Galton, to whom we are indebted for this statement, will enlighten us. At all events, the members of the Anthropological Society of London will not be likely to find fault with the arrangement, which will give them a department in this Section (D) under the presidency of Mr. Wallace, and thus leave them to dispose of the "Science of Man" in their own way. We are glad of this, for the Anthropologists have had an uphill fight, and have stuck well to their colours for the last four years, and we congratulate them heartily on having at last convinced the authorities of the British Association of their claims to recognition. The Secretaries of this new department are Messrs. Felkin (a local celebrity) and E. B. Tylor; and among the committee we find the names of Messrs. Hunt, Charnock, C. Carter Blake, Fairbank, and others, from which selection we argue that Anthropology will not be long behind the sister sciences at the British Institution.

To-morrow at eleven, the work of the sections commences. The following are the places appointed for meeting: Sections A, B, and C at the School of Art, far removed from the centre of the town; D at Derby Road School-rooms, and also at a few hastily improvised school-rooms adjacent thereto; E at Mechanics' Hall; F at Circus Street Chapel; and G at St. George's Hall. Among the papers proposed to be read to-morrow in Section E are, Baker on the "Abyssinian Tributaries of the Nile;" Brine on "Eruptions in the Island of Santorino;" Crawfurd, "Cæsar's Account of Britain at the time of Julius Cæsar;" Dr. Beke on "The Nile;" and Mr. Thomas Baines on "The Limpopo," and on "The Zambesi." Those for the Anthropological Department (Section D), include the President's Address; a paper by Mr. C. Carter

Blake, on the Human Remains, and particularly on the "Pithecoïd" Human Jaw, discovered near Dinant, in Belgium; Black on South Africa; Collinson on the Mosquito Indians; Consul Hutchinson on the Parana Indians; and Dr. Charnock on Andorra.

The meeting bids fair at present to be a large one, as in the course of yesterday and to-day a great number of visitors have arrived, and many more are expected. It will also be large in point of work; but it is impossible to do more than make a rough guess at so early a period of the transactions. It is rumoured that the store of papers in the hands of the Geological Section (C) is very limited. The first paper in Section E on Friday is to be read by W. G. Palgrave, Esq., the Arabian traveller, and will certainly excite a great deal of interest. The place of meeting for next year is being considerably canvassed. Invitations have been received from Dundee, Norwich, Exeter, and Plymouth. Of course, all the Scotch influence is being exerted in favour of Dundee; but those who know what a delightful place Norwich is, how easily accessible, and how full of commodious buildings for meetings, and of interesting objects for passing the hours of leisure, sincerely hope that it will carry the day over the head of its Northern rival. Besides, Norwich, with its celebrated musical festivals, is used to receiving and entertaining crowds of visitors, and would probably give the British Association an opportunity of retrieving the blunder they have committed of bringing the meeting this year to a town where the inhabitants appear to be just waking up and rubbing their eyes, instead of having all things ready, and where so very small an amount of local sympathy appears to be shown.

MR. GROVE'S INAUGURAL ADDRESS.

GENTLEMEN OF THE BRITISH ASSOCIATION,—If our rude predecessors, who at one time inhabited the caverns which surround this town, could rise from their graves and see it in its present state, it may be doubtful whether they would have sufficient knowledge to be surprised.

The machinery, almost resembling organic beings in delicacy of structure, by which you fabricate products of world-wide reputation, the powers of matter applied to give motion to that machinery, are so far removed from what must have been the conceptions of the semi-barbarians to whom I have alluded, that they could not look on them with intelligent wonder.

Yet this immense progress has all been effected step by step, now and then a little more sudden than at other times; but, viewing the whole course of improvement, it has been gradual, though moving in an accelerated ratio. But it is not merely in those branches of natural knowledge which tend to improvements in economical arts and manufactures that science has made great progress. In the study of our own planet and the organic beings with which it is crowded, and in so much of the universe as vision, aided by the telescope, has brought within the scope of observation, the present century has surpassed any antecedent period of equal duration.

It would be difficult to trace out all the causes which have led to the increase of observational and experimental knowledge.

Among the more thinking portion of mankind the gratification felt by the discovery of new truths, the expansion of faculties, and extension of the boundaries of knowledge, have been doubtless a sufficient inducement to the study of nature; while, to the more practical minds, the reality, the certainty, and the progressive character of the acquisitions of natural science, and the enormously-increased means which its applications give, have impressed its importance as a minister to daily wants and a contributor to ever-increasing material comforts, luxury, and power.

Though by no means the only one, yet an important cause of the rapid advance of science is the growth of associations for promoting the progress either of physical knowledge generally, or of special branches of it. Since the foundation of the Royal Society, now more than two centuries ago, a vast number of kindred societies have sprung up in this country and in Europe. The advantages conferred by these societies are manifold; they enable those who are devoted to scientific research, to combine, compare, and check their observations, to assist, by the thoughts of several minds, the promotion of the inquiry undertaken; they contribute from a joint purse to such efforts as their members deem most worthy; they afford a means of submitting to a competent tribunal notices and memoirs, and of obtaining for their authors and others, by means of the discussions which ensue, information given by those best informed on the particular subject; they enable the author to judge whether it is worth his while to pursue the subjects he has brought forward, and they defray the expense of printing and publishing such researches as are thought deserving of it.

These advantages, and others might be named, pertain to the association the thirty-sixth meeting of which we are this evening assembled to inaugurate; but it has, from its intermittent and peripatetic character, advantages which belong to none of the societies which are fixed as to their locality.

Among these are the novelty and freshness of an annual meeting, which, while it brings together old members of the association, many of whom only meet on this occasion, always adds a quota of new members, infusing new blood, and varying the social character of our meetings.

The visits of distinguished foreigners, whom we have previously known by reputation, is one of the most delightful and improving of the results. The wide field of inquiry, and the character of communications made to the association, including all branches of natural knowledge, and varying from simple notices of an interesting observation or experiment to the most intricate and refined branches of scientific research, is another valuable characteristic.

Lastly, perhaps the greatest advantage resulting from the annual visits of this great Parliament to new localities is, that while it imparts fresh local knowledge to the visitors, it leaves behind stimulating memories, which rouse into permanent activity dormant or timid minds—an effect which, so far from ceasing with the visit of the association, frequently begins when that visit terminates.

Every votary of physical science must be anxious to see it recognized by those institutions of the country which can to the greatest degree promote its cultivation and reap from it the greatest benefit. You will probably agree with me that the principal educational establishments on the one hand, and on the other the Government in many of its departments, are the institutions which may best fulfil these conditions. The more early the mind is trained to a pursuit of any kind, the deeper and more permanent are the impressions received, and the more service can be rendered by the students.

> Quo semel est imbuta recens, servabit odorem
> Testa diu.

Little can be achieved in scientific research without an acquaintance with it in youth; you will rarely find an instance of a man who has attained any eminence in science who has not commenced its study at a very early period of life. Nothing, again, can tend more to the promotion of science than the exertions of those who have early acquired the ἦθος resulting from a scientific education. I desire to make no complaint of the tardiness with which science has been received at our Public Schools and, with some exceptions, at our Universities. These great establishments have their roots in historical periods, and long time and patient endeavour is requisite before a new branch of thought can be grafted with success on a stem to which it is exotic. Nor should I ever wish to see the study of languages, of history, of all those refined associations which the past has transmitted to us, neglected; but there is room for both. It is sad to see the number of so-called educated men who, travelling by railway, voyaging by steamboat, consulting the almanac for the time of sunrise or full-moon, have not the most elementary knowledge of a steam-engine, a barometer, or a quadrant; and who will listen with a half-confessed faith to the most idle predictions as to weather or cometic influences, while they are in a state of crass ignorance as to the cause of the trade-winds or the form of a comet's path. May we hope that the slight infiltration of scientific studies, now happily commenced, will extend till it occupies its fair space in the education of the young, and that those who may be able learnedly to discourse on the Eolic digamma will not be ashamed of knowing the principles of an air-pump, an electrical machine, or a telescope, and will not, as Bacon complained of his contemporaries, despise such knowledge as something mean and mechanical.

To assert that the great departments of Government should encourage physical science may appear a truism, and yet it is but of late that it has been seriously done; now, the habit of consulting men of science on important questions of national interest is becoming a recognized practice, and in a time which may seem long to individuals, but is short in the history of a nation, a more definite sphere of usefulness for national purposes will, I have no doubt, be provided for those duly-qualified men who may be content to give up the more tempting study of abstract science for that of its practical applications. In this respect the report of the Kew Committee for this year affords a subject of congratulation to those whom I have the honour to address. The Kew Observatory, the petted child of the British Association, may possibly become an important national establishment; and if so, while it will not, I trust, lose its character of a home for untrammelled physical research, it will have superadded the Meteorological Department of the Board of Trade, with a staff of skilful and experienced observers.

This is one of the results which the general growth of science, and the labours of this association in particular, have produced; but I do not propose on this occasion to recapitulate the special objects attained by the association, this has been amply done by several of my predecessors; nor shall I confine my address to the progress made in physical science since the time when my most able and esteemed friend and predecessor addressed you at Birmingham. In the various reports and communications which will be read at your sections, details of every step which has been made in science since our last meeting will be brought to your notice, and I have no doubt fully and freely discussed.

I purpose, with your kind permission, to submit to you certain views of what has within a comparatively recent period been accomplished by science, what have been the steps leading to the attained results, and what, as far as we may fairly form an opinion, is the general character pervading modern discovery.

It seems to me that the object we have in view would be more nearly approached, by each President, chosen as they are in succession as representing different branches of science, giving on these occasions either an account of the progress of the particular branch of science he has cultivated, when that is not of a very limited and special character, or enouncing his own view of the general progress of science; and though this will necessarily involve much that belongs to recent years, the confining a President to a mere *resumé* of what has taken place since our last meeting would, I venture with diffidence to think, limit his means of usefulness, and render his discourse rather an annual register than an instructive essay.

I need not dwell on the common-place but yet important topics of the material advantages resulting from the application of science; I will address myself to what, in my humble judgment, are the lessons we have learned and the probable prospects of improved natural knowledge.

One word will give you the key to what I am about to discourse on; that word is *continuity*—no new word, and used in no new sense, but perhaps applied more generally than it has hitherto been. We shall see, unless I am much mistaken, that the development of observational, experimental, and even deductive knowledge is either attained by steps so extremely small as to form really a continuous ascent; or, when distinct results apparently separate from any co-ordinate phenomena have been attained, that then, by the subsequent progress of science, intermediate links have been discovered, uniting the apparently segregated instances with other more familiar phenomena.

Thus the more we investigate, the more we find that in existing phenomena graduation from the like to the seemingly unlike prevails, and in the changes which take place in time, gradual progress is, and apparently must be, the course of nature.

Let me now endeavour to apply this view to the recent progress of some of the more prominent branches of science.

In astronomy, from the time when the earth was considered a flat plain bounded by a flat ocean—when the sun, moon, and stars were regarded as lanterns to illuminate this plain—each successive discovery has brought with it similitudes and analogies between this earth and many of the objects of the universe with which our senses, aided by instruments, have made us acquainted. I pass, of course, over those discoveries which have established the Copernican system as applied to our sun, its attendant

planets, and their satellites. The proofs, however, that gravitation is not confined to our solar system, but pervades the universe, have received many confirmations by the labours of members of this association. I may name those who have held the office of President, Lord Rosse, Lord Wrottesley, and Sir J. Herschel, the two latter having devoted special attention to the orbits of double stars, the former to those probably more recent systems called nebulæ. Double stars seem to be orbs analogous to our own sun, and revolving round their common centre of gravity in a conic-section curve, as do the planets with which we are more intimately acquainted; but the nebulæ present more difficulty, and some doubt has been expressed whether gravitation, such as we consider it, acts with those bodies (at least those exhibiting a spiral form) as it does with us; possibly some other modifying influence may exist, our present ignorance of which gives rise to the apparent difficulty. There is, however, another class of observations quite recent in its importance, and which has formed a special subject of contribution to the Reports and Transactions of this association; I allude to those on Meteorites, at which our lamented member, and to many of us our valued friend, Professor Baden Powell assiduously laboured, for investigations into which a committee of this association is formed, and a series of star-charts, for enabling observers of shooting stars to record their observations, was laid before the last meeting of the association by Mr. Glaisher.

It would occupy too much of your time to detail the efforts of Bessel, Schwinke, the late Sir J. Lubbock, and others, as applied to the formation of star-charts for aiding the observation of meteorites which Mr. Alexander Herschel, Mr. Brayley, Mr. Sorby, and others are now studying.

Dr. Olmstead explained the appearance of a point from which the lines of flight of meteors seem to radiate, as being the perspective vanishing point of their parallel or nearly parallel courses appearing to an observer on the earth as it approaches them. The uniformity of position of these radiant points, the many corroborative observations on the direction, the distances, and the velocities of these bodies, the circumstance that their paths intersect the earth's orbit at certain definite periods, and the total failure of all other theories which have been advanced, while there is no substantial objection to this, afford evidence almost amounting to proof that these are cosmical bodies moving in the interplanetary space by gravitation round the sun, and some perhaps round planets. This view gives us a new element of continuity. The universe would thus appear not to have the extent of empty space formerly attributed to it, but to be studded between the larger and more visible masses with smaller planets, if the term be permitted to be applied to meteorites.

Observations are now made at the periods at which meteors appear in greatest numbers—at Greenwich by Mr. Glaisher, at Cambridge by Professor Adams, and at Hawkhurst by Mr. Alexander Herschel—and every preparation is made to secure as much accuracy as can, in the present state of knowledge, be secured for such observations.

The number of known asteroids, or bodies of a smaller size than what are termed the ancient planets, has been so increased by numerous discoveries, that instead of seven we now count eighty-eight as the number of recognized planets—a field of discovery with which the name of Hind will be ever associated.

If we add these, the smallest of which is only three or four miles in diameter, indeed cannot be accurately measured, and if we were to apply the same scrutiny to other parts of the heavens as has been applied to the zone between Mars and Jupiter, it is no far-fetched speculation to suppose that between these asteroids and the meteorites, bodies of intermediate size exist, until the space occupied by our solar system becomes filled up with planetary bodies, varying in size from that of Jupiter (1,240 times larger in volume than the earth) to that of a cannon-ball or even a pistol-bullet.

The researches of Leverrier on the intra-mercurial planets come in aid of these views; and another half century may, and not improbably will, enable us to ascertain that the now seemingly vacant interplanetary spaces are occupied by smaller bodies which have hitherto escaped observation, just as the asteroids had until the time of Olbers and Piazzi. But the evidence of continuity as pervading the universe does not stop at telescopic observation; chemistry and physical optics bring us new proofs. Those meteoric bodies which have from time to time come so far within reach of the earth's attraction as to fall upon its surface, give on analysis metals and oxides similar to those which belong to the structure of the earth—they come as travellers, bringing specimens of minerals from extra-terrestrial regions.

In a series of papers recently communicated to the French Academy, M. Daubrée has discussed the chemical and mineralogical character of meteorites as compared with the rocks of the earth. He finds that the similarity of terrestrial rocks to meteorites increases as we penetrate deeper into the earth's crust, and that some of the deep-seated minerals have a composition and characteristics almost identical with meteorites [olivine, herzolite, and serpentine, for instance, closely resemble them]; that as we approach the surface, rocks having similar components with meteorites are found, but in a state of oxidation, which necessarily much modifies their mineral character, and which, by involving secondary oxygenized compounds, must also change their chemical constitution. By experiments, he has succeeded in forming from terrestrial rocks substances very much resembling meteorites. Thus close relationship, though by no means identity, is established between this earth and those wanderers from remote regions, some evidence, though at present incomplete, of a common origin.

Surprise has often been expressed that, while the mean specific gravity of this globe is from five to six times that of water, the mean specific gravity of its crust is barely half as great. It has long seemed to me that there is no ground for wonder here. The exterior of our planet is to a considerable depth oxidated; the interior is, in all probability, free from oxygen, and whatever bodies exist there are in a reduced or deoxidated state; if so, their specific gravity must necessarily be higher than that of their oxides or chlorides, &c.: we find, moreover, that some of the deep-seated minerals have a higher specific gravity than the average of those on the surface; olivine, for instance, has a specific gravity of 3·3. There is therefore no *à priori* impossibility that the mean specific gravity of the earth should notably exceed that of its surface; and if we go further and suppose the interior of the earth to be formed of the same ingredients as the exterior, minus oxygen, chlorine, bromine, &c., a specific gravity of 5 to 6 would not be an unlikely one. Many of the elementary bodies entering largely into the formation of the earth's crust are as light or lighter than water—for instance, potassium, sodium, &c.; others, such as sulphur, silicon, aluminium, have from two to three times its specific gravity; others, again, as iron, copper, zinc, tin, seven to nine times; while others, lead, gold, platinum, &c., are much more dense—but speaking generally, the more dense are the least numerous. There seems no improbability in a mixture of such substances producing a mean specific gravity of from 5 to 6, although it by no means follows, indeed the probability is rather the other way, that the proportions of the substances in the interior of the earth are the same as on the exterior. It might be worth the labour to ascertain the mean specific gravity of all the known minerals on the earth's surface, averaging them in the ratios in which, as far as our knowledge goes, they quantitatively exist, and assuming them to exist without the oxygen, chlorine, &c., with which they are, with some rare exceptions, invariably combined on the surface of the earth: great assistance to the knowledge of the probable constitution of the earth might be derived from such an investigation.

While chemistry, analytic and synthetic, thus aids us in ascertaining the relationship of our planet to meteorites, its relation in composition to other planets, to the sun, and to more distant suns and systems, is aided by another science, viz., optics.

That light passing from one transparent medium to another should carry with it evidence of the source from which it emanates, would, until lately, have seemed an extravagant supposition; but probably (could we read it) everything contains in itself a large portion of its own history.

I need not detail to you the discoveries of Kirchhoff, Bunsen, Miller, Huggins, and others, they have been dilated on by my predecessor. Assuming that spectrum analysis is a reliable indication of the presence of given substances by the position of transverse bright lines exhibited when they are burnt and of transverse dark lines when light is transmitted through their vapours, though Plücker has shown that with some substances these lines vary with temperature, the point of importance in the view I am presenting to you is, that while what may be called comparatively neighbouring cosmical bodies exhibit lines identical with many of those shown by the components of this planet, as we proceed to the more distant appearances of the nebulæ we get but one or two of such lines, and we get one or two new bands not yet identified with any known to be produced by substances on this globe.

Within the last year Mr. Huggins has added to his former researches observations on the spectrum of a comet (comet 1 of 1866), the nucleus of which shows but one bright line, while the spectrum formed by the light of the coma is continuous, seeming to show that the nucleus is gaseous while the coma would consist of matter in a state of minute division shining by reflected light; whether this be solid, liquid, or gaseous, is doubtful, but the author thinks it is in a condition analogous to that of fog or cloud. The position in the spectrum of the bright line furnished by the nucleus is the same as that of nitrogen, which also is shown in some of the nebulæ.

But the most remarkable achievement by spectrum analysis is the record of observations on a temporary star which has shone forth this year in the constellation of the northern crown about a degree S.E. of the star ε. When it was first seen, May 12th, it was nearly equal in brilliancy to a star of the second magnitude; when observed by Mr. Huggins and Dr. Miller, May 16th, it was reduced to the third or fourth magnitude. Examined by these observers with the spectroscope, it gave a spectrum which they state was unlike that of any celestial body they had examined.

The light was compound, and had emanated from two different sources. One spectrum was analogous to that of the sun—viz., formed by the light of an incandescent solid or liquid photosphere which had suffered absorption by the vapours of an envelope cooler than itself. The second spectrum consisted of a few bright lines, which indicated that the light by which it was formed was emitted by matter in the state of luminous gas. They consider that, from the position of two of the bright lines, the gas must be probably hydrogen, and from their brilliancy compared with the light of the photosphere, the gas must have been at a very high temperature. They imagine the phenomena to result from the burning of hydrogen with some other element, and that from the resulting temperature the photosphere is heated to incandescence.

There is strong reason to believe that this star is one previously seen by Argelander and Sir J. Herschel, and that it is a variable star of long or irregular period; it is also notable that some of its spectrum lines correspond with those of several variable stars. The time of its appearance was too short for any attempt to ascertain its parallax; it would have been important if it could even have been established that it is not a near neighbour, as the magnitude of such a phenomenon must depend upon its distance. I forbear to add any speculations as to the cause of this most singular phenomenon; however imperfect the knowledge given us by these observations, it is a great triumph to have caught this fleeting object, and obtained permanent records for the use of future observers.

It would seem as if the phenomenon of gradual change obtained towards the remotest objects with which we are at present acquainted, and that the further we penetrate into space the more unlike to those we are acquainted with become the objects of our examination,—sun, planets, meteorites, earth, similarly though not identically constituted; stars differing from each other and from our system; and nebulæ more remote in space, and differing more in their characters and constitution.

While we thus can to some extent investigate the physical constitution of the most remote visible substances, may we not hope that some further insight as to the constitution of the nearest—viz., our own satellite—may be given us by this class of researches? The question whether the moon possesses any atmosphere may still be regarded as unsolved. If there be any, it must be exceedingly small in quantity and highly attenuated. Calculations made from occultation of stars, on the apparent differences of the semi-diameter of the bright and dark moon give an amount of difference which might indicate a minute atmosphere, but which Mr. Airy attributes to irradiation.

Supposing the moon to be constituted of similar materials to the earth, it must be, to say the least, doubtful whether there is oxygen

enough to oxidate the metals of which she is composed; and if not, the surface which we see must be metallic or nearly so. The appearance of her craters is not unlike that seen on the surface of some metals, such as bismuth, or, according to Professor Phillips, silver, when cooling from fusion and just previous to solidifying; and it might be a fair subject of inquiry whether, if there be any coating of oxide on the surface, it may not be so thin as not to disguise the form of the congealed metallic masses, as they may have set in cooling from igneous fusion. M. Chacornac's recent observations lead him to suppose that many of the lunar craters were the result of a single explosion, which raised the surface as a bubble and deposited its *débris* around the orifice of eruption.

The eruptions on the surface of the moon clearly did not take place at one period only, for at many parts of the disk craters may be seen encroaching on and disfiguring more ancient craters, sometimes to the extent of three or four successive displacements. Two important questions might, it seems to me, be solved by an attentive examination of such portions of the moon. By observing carefully with the most powerful telescopes the character of the ridges thus successively formed, the successive states of the lunar surface at different epochs might be elucidated; and secondly, as on the earth we should look for actual volcanic action at those points where recent eruptions have taken place, so on the moon the more recently active points being ascertained by the successive displacement of anterior formation, it is these which should be examined for existing disruptive disturbances. Metius and Fabricius might be cited as points of this character, having been found by M. Chacornac to present successive displacements and to be perforated by numerous channels or cavities. M. Chacornac considers that the seas, as they are called, or smoother portions of the lunar surface, have at some time made inroads on anteriorly formed craters; if so, a large portion of the surface of the moon must have been in a fused, liquid, semi-liquid, or alluvial state long after the solidifying of other portions of it. It would be difficult to suppose that this state was one of igneous fusion, for this could hardly exist over a large part of the surface without melting up the remaining parts; on the other hand, the total absence of any signs of water, and of any, or, if any, only the most attenuated atmosphere, would make it equally difficult to account for a large diluvial formation.

Some substances, like mercury on this planet, might have remained liquid after others had solidified; but the problem is one which needs more examination and study before any positive opinion can be pronounced.

I cannot pass from the subject of lunar physics without recording the obligation we are under to our late President for his most valuable observations, and for his exertions in organizing a band of observers devoted to the examination of this our nearest celestial neighbour, and to Mr. Nasmyth and Mr. de la Rue for their important graphical and photographical contributions to this subject. The granular character of the sun's surface observed by Mr. Nasmyth in 1860 is also a discovery which ought not to be passed over in silence.

Before quitting the subject of astronomy, I cannot avoid expressing a feeling of disappointment that the achromatic telescope, which has rendered such notable service to this science, still retains in practice the great defect which was known a century ago at the time of Hall and Dollond—namely, the inaccuracy of definition arising from what was termed the irrationality of the spectrum, or the incommensurate divisions of the spectra formed by flint and crown glass.

The beautiful results obtained by Blair have remained inoperative from the circumstance that evaporable liquids being employed between the lenses, a want of permanent uniformity in the instrument was experienced; and notwithstanding the high degree of perfection to which the grinding and polishing object-glasses has been brought by Clarke, Cooke, and Mertz, notwithstanding the greatly-improved instrumental manufacture, the defect to which I have adverted remains unremedied, and an eye-sore to the observer with the refracting telescope.

We have now a large variety of different kinds of glass formed from different metallic oxides. A list of many such was given by M. Jacquelain a few years back; the last specimen which I have seen is a heavy highly-refracting glass formed from the metal thallium by M. Lamy. Among all these, could no two or three be selected which, having appropriate refracting and dispersing powers, would have the coloured spaces of their respective spectra, if not absolutely in the same proportions, at all events much more nearly so than those of flint and crown glass? Could not, again, oily or resinous substances having much action on the green or middle colour of the spectrum, such as castor oil, Canada balsam, &c., be made use of in combination with glass lenses to reduce if not annihilate this signal defect? This is not a problem to the solution of which there seems any insuperable difficulty; the reason why it has not been solved is, I incline to think, that the great practical opticians have no time at their disposal to devote to long tentative experiments and calculations, and on the other hand the theoretic opticians have not the machinery and the skill in manipulation requisite to give the appropriate degree of excellence to the materials with which they experiment; yet the result is worth labouring for, as, could the defect be remedied, the refracting telescope would make nearly as great an advance upon its present state as the achromatic did on the single lens refractor.

While gravitation, physical constitution, and chemical analysis by the spectrum show us that matter has similar characteristics in other worlds than our own, when we pass to the consideration of those other attributes of matter which were at one time supposed to be peculiar kinds of matter itself, or, as they were called, imponderables, but which are now generally, if not universally, recognized as forces or modes of motion, we find the evidence of continuity still stronger.

When all that was known of magnetism was that a piece of steel rubbed against a particular mineral had the power of attracting iron, and, if freely suspended, of arranging itself nearly in a line with the earth's meridian, it seemed an exceptionable phenomenon. When it was observed that amber, if rubbed, had the temporary power of attracting light bodies, this also seemed something peculiar and anomalous. What are now Magnetism and Electricity? forces so universal, so apparently connected with matter, as to become two of its invariable attributes, and that to speak of matter not being capable of being affected by these forces would seem almost as extravagant as to speak of matter not being affected by gravitation.

So with light, heat, and chemical affinity, not merely is every form of matter with which we are acquainted capable of manifesting all these modes of force, but so-called matter supposed incapable of such manifestations would to most minds cease to be matter.

Further than this, it seems to me (though, as I have taken an active part for many years, now dating from a quarter of a century, in promoting this view, I may not be considered an impartial judge) that it is now proved that all these forces are so invariably connected *inter se* and with motion as to be regarded as modifications of each other, and as resolving themselves objectively into motion, and subjectively into that something which produces or resists motion, and which we call Force.

I may perhaps be permitted to recall a forgotten experiment, which nearly a quarter of a century ago I showed at the London Institution, an experiment simple enough in itself, but which then seemed to me important from the consequences to be deduced from it, and the importance of which will be much better appreciated now than then.

A train of multiplying wheels ended with a small metallic wheel, which, when the train was put in motion, revolved with extreme rapidity against the periphery of the next wheel, a wooden one. In the metallic wheel was placed a small piece of phosphorus, and as long as the wheels revolved, the phosphorus remained unchanged, but the moment the last wheel was stopped by moving a small lever attached to it, the phosphorus burst into flame. My object was to show that while motion of the mass continued, heat was not generated, but that when this was arrested, the force continuing to operate, the motion of the mass became heat in the particles. The experiment differed from that of Rumford's cannon-boring and Davy's friction of ice, in showing that there was no heat while the motion was unresisted, but that the heat was in some way dependent on the motion being impeded or arrested. We have now become so accustomed to this view, that whenever we find motion resisted we look to heat, electricity, or some other force as the necessary and inevitable result.

It would be out of place here, and treating of matters too familiar to the bulk of my audience, to trace how, by the labours of Oersted, Seebeck, Faraday, Talbot, Daguerre, and others, the way has been prepared for the generalization now known as the correlation of forces or conservation of energy, while Davy, Rumford, Seguin, Mayer, Joule, Helmholtz, Thomson, and others (among whom I would not name myself, were it not that I may be misunderstood and supposed to have abandoned all claim to a share in the initiation of this, as I believe, important generalization) have carried on the work; and how, sometimes by independent and, as is commonly the case, nearly simultaneous deductions, sometimes by progressive and accumulated discoveries, the doctrine of the reciprocal interaction, of the quantitative relation, and of the necessary dependence of all the forces has, I think I may venture to say, been established.

If magnetism be, as it is proved to be, connected with the other forces or affections of matter, if electrical currents always produce, as they are proved to do, lines of magnetic force at right angles to their lines of action, magnetism must be cosmical, for where there is heat and light, there is electricity and consequently magnetism. Magnetism, then, must be cosmical, and not merely terrestrial. Could we trace magnetism in other planets and suns as a force manifested in axial or meridional lines—*i.e.*, in lines cutting at right angles the curves formed by their rotation round an axis—it would be a great step; but it is one hitherto unaccomplished. The apparent coincidence between the maxima and minima of solar spots, and the decennial or undecennial periods of terrestrial magnetic intensity, though only empirical at present, might tend to lead us to a knowledge of the connexion we are seeking; and the President of the Royal Society considers that an additional epoch of coincidence has arrived, making the fourth decennial period; but some doubt is thrown upon these coincidences by the magnetic observations made at Greenwich Observatory. In a paper published in the "Transactions of the Royal Society," 1863, the Astronomer Royal says, speaking of results extending over seventeen years, "there is no appearance of decennial cycle in the recurrence of great magnetic disturbances;" and Mr. Glaisher last year, in the Physical Section of this association, stated that after persevering examination he had been unable to trace any connexion between the magnetism of the earth and the spots on the sun.

Mr. Airy, however, in a more recent paper, suggests that currents of magnetic force having reference to the solar hour are detected, and seem to produce vortices or circular disturbances, and he invites further co-operative observation on the subject, one of the highest interest, but at present remaining in great obscurity.

One of the most startling suggestions as to the consequence resulting from the dynamical theory of heat is that made by Mayer, that by the loss of *vis viva* occasioned by friction of the tidal waves, as well as by their forming, as it were, a drag upon the earth's rotatory movement, the velocity of the earth's rotation must be gradually diminishing, and that thus, unless some undiscovered compensatory action exist, this rotation must ultimately cease, and changes hardly calculable take place in the solar system.*

M. Delaunay considers that part of the acceleration of the moon's mean motion which is not at present accounted for by planetary disturbances, to be due to the gradual retardation of the earth's rotation; to which view, after an elaborate investigation, the Astronomer Royal has given his assent.

Another most interesting speculation of Mayer is that with which you are familiar –viz., that the heat of the sun is occasioned by friction o percussion of meteorites falling upon it; there ar some difficulties, not perhaps insuperable, in this theory. Supposing such cosmical bodies to exist in sufficient numbers, they would, as they revolve round the sun, fall into it, not as an aërolite falls upon the earth directly by an intersection of orbits, but by the gradual reduction in size of the orbits, occasioned by a resisting medium; some portion of force would be lost, and heat generated in space by friction against such medium; when they arrive at the sun they would, assuming them, like the planets, to have revolved in the same direction, all impinge in a definite direction, and we might expect to see some symptoms of such in the sun's photosphere but though this is in a constant state of motion and the direction of these movements has been carefully investigated by Mr. Carrington and others, no such general direction is detected;

* See on this the paper by Mr. Croll in the *Philosophical Magazine* for August.—Ed.

and M. Faye, who some time ago wrote a paper pointing out many objections to the theory of solar heat being produced by the fall of meteoric bodies into the sun, has recently investigated the proper motions of sun-spots, and believes he has removed certain apparent anomalies and reduced their motions to a certain regularity in the motion of the photosphere, attributable to some general action arising from the internal mass of the sun.

It might be expected that comets, bodies so light and so easily deflected from their course, would show some symptoms of being acted on by gravitation, were such a number of bodies to exist in or near their paths as are presupposed in the mechanical theory of solar heat.

Assuming the undulatory theory of light to be true, and that the motion which constitutes light is transmitted across the interplanetary spaces by a highly elastic ether, then, unless this motion is confined to one direction, unless there be no interference, unless there be no viscosity, as it is now termed, in the medium, and consequently no friction, light must lose something in its progress from distant luminous bodies—that is to say, must lose something as light; for, as all reflecting minds are now convinced that force cannot be annihilated, the force is not lost, but its mode of action is changed. If light, then, is lost as light (and the observations of Struvé seem to show this to be so, that, in fact, a star may be so far distant that it can never be seen in consequence of its luminous emissions becoming extinct), what becomes of the transmitted force lost as light, but existing in some other form? So with heat: our sun, our earth, and planets are constantly radiating heat into space; so in all probability are the other suns, the stars, and their attendant planets. What becomes of the heat thus radiated into space? If the universe have no limit, and it is difficult to conceive one, there is a constant evolution of heat and light; and yet more is given off than is received by each cosmical body, for otherwise night would be as light and as warm as day. What becomes of the enormous force thus apparently non-recurrent in the same form? Does it return as palpable motion? Does it move or contribute to move suns and planets? and can it be conceived as a force similar to that which Newton speculated on as universally repulsive and capable of being substituted for universal attraction? We are in no position at present to answer such questions as these; but I know of no problem in celestial dynamics more deeply interesting than this, and we may be no further removed from its solution than the predecessors of Newton were from the simple dynamical relation of matter to matter which that potent intellect detected and demonstrated.

Passing from extra terrestrial theories to the narrower field of molecular physics, we find the doctrine of correlation of forces steadily making its way. In the Bakerian Lecture of 1863, Mr. Sorby shows, not perhaps a direct correlation of mechanical and chemical forces, but that when, either by solution or by chemical action, a change in volume of the resulting substance as compared with that of its separate constituents is effected, the action of pressure retards or promotes the change, according as the substance formed would occupy a larger or a smaller space than that occupied by its separate constituents; the application of these experiments to geological inquiries as to subterranean changes which may have taken place under great pressure is obvious, and we may expect to form compounds under artificial compression which cannot be found under normal pressure.

In a practical point of view, the power of converting one mode of force into another is of the highest importance; and with reference to a subject which at present, somewhat prematurely perhaps, occupies men's minds—viz., the prospective exhaustion of our coal-fields,—there is every encouragement derivable from the knowledge that we can at will produce heat by the expenditure of other forces; but, more than that, we may probably be enabled to absorb or store up as it were diffused energy—for instance, Berthelot has found that the potential energy of formate of potash is much greater than that of its proximate constituents, caustic potash and carbonic oxide. This change may take place spontaneously and at ordinary temperatures, and by such change carbonic oxide becomes, so to speak, reinvested with the amount of potential energy which its carbon possessed before uniting with oxygen, or, in other words, the carbonic oxide is raised as a force-possessor to the place of carbon by the direct absorption or conversion of heat from surrounding matter.

Here we have as to force-absorption, an analogous result to that of the formation of coal from carbonic acid and water; and though this is a mere illustration, and may never become economical on a large scale, still it and similar examples may calm apprehension as to future means of supplying heat, should our present fuel become exhausted. As the sun's force, spent in times long past, is now returned to us from the coal which was formed by that light and heat, so the sun's rays, which are daily wasted, as far as we are concerned, on the sandy deserts of Africa, may hereafter, by chemical or mechanical means, be made to light and warm the habitations of the denizens of colder regions. The tidal wave is, again, a large reservoir of force hitherto almost unused.

The valuable researches of Prof. Tyndall on radiant heat afford many instances of the power of localizing, if the term be permitted, heat which would otherwise be dissipated.

The discoveries of Graham, by which atmospheric air drawn through films of caoutchouc, leaves behind half its nitrogen, or in other words, becomes richer by half in oxygen, and hence has a much increased potential energy, not only show a most remarkable instance of physical molecular action, merging into chemical, but afford us indications of means of storing up force, much of the force used in working the aspirator being capable at any period, however remote, of being evolved by burning the oxygen with a combustible.

What changes may take place in our modes of applying force before the coal-fields are exhausted it is impossible to predict. Even guesses at the probable period of their exhaustion are uncertain. There is a tendency to substitute for smelting in metallurgic processes, liquid chemical action, which of course has the effect of saving fuel; and the waste of fuel in ordinary operations is enormous, and can be much economized by already known processes. It is true that we are, at present, far from seeing a practical mode of replacing that granary of force, the coal-fields; but we may with confidence rely on invention being in this case, as in others, born of necessity, when the necessity arises.

I will not further pursue this subject; at a time when science and civilization cannot prevent large tracts of country being irrigated by human blood in order to gratify the ambition of a few restless men, it seems an over-refined sensibility to occupy ourselves with providing means for our descendants in the tenth generation to warm their dwellings or propel their locomotives.

Two very remarkable applications of the convertibility of force have been recently attained by the experiments of Mr. Wilde and Mr. Holz; the former finds that, by conveying electricity from the coils of a magneto-electric machine to an electro-magnet, a considerable increase of electrical power may be attained, and by applying this as a magneto-electric machine to a second, and in turn to a third electro-magnetic apparatus, the force is largely augumented. Of course, to produce this increase, more mechanical force must be used at each step to work the magneto-electric machines; but provided this be supplied there hardly seems a limit to the extent to which mechanical may be converted into electrical force.

Mr. Holz has contrived a Franklinic electrical machine, in which a similar principle is manifested. A varnished glass plate is made to revolve in close proximity to another plate having two or more pieces of card attached, which are electrified by a bit of rubbed glass or ebonite; the moment this is effected, a resistance is felt by the operator who turns the handle of the machine, and the slight temporary electrization of the card converts into a continuous flood of intense electricity the force supplied by the arm of the operator.

These results offer great promise of extended application; they show that, by a mere formal disposition of matter, one force can be converted into another, and that not to the limited extent hitherto attained, but to an extent co-ordinate, or nearly so, with the increased initial force, so that, by a mere change in the arrangement of apparatus, a means of absorbing and again eliminating in a new form a given force may be obtained to an indefinite extent. As we may, in a not very distant future, need, for the daily uses of mankind, heat, light, and mechanical force, and find our present resources exhausted, the more we can invent new modes of conversion of forces, the more prospect we have of practically supplying such want. It is but a month from this time that the greatest triumph of force-conversion has been attained. The chemical action generated by a little salt water on a few pieces of zinc will now enable us to converse with inhabitants of the opposite hemisphere of this planet, and

Put a girdle round about the earth in forty minutes.

The Atlantic Telegraph is an accomplished fact.

In physiology very considerable strides are being made by studying the relation of organized bodies to external forces; and this branch of inquiry has been promoted by the labours of Carpenter, Bence Jones, Playfair, E. Smith, Frankland, and others. Vegetables acted on by light and heat decompose water, ammonia, and carbonic acid, and transform them into, among other substances, oxalate of lime, lactic acid, starch, sugar, stearine, urea, and ultimately albumen; while the animal reverses the process, as does vegetable decay, and produces from albumen, urea, stearine, sugar, starch, lactic acid, oxalate of lime, and ultimately ammonia, water, and carbonic acid.

As, moreover, heat and light are absorbed, or converted in forming the synthetic processes going on in the vegetable, so conversely heat and sometimes light is given off by the living animal; but it must not be forgotten that the line of demarcation between a vegetable and an animal is difficult to draw, that there are no single attributes which are peculiar to either, and that it is only by a number of characteristics that either can be defined.

The series of processes above given may be simulated by the chemist in his laboratory; and the amount of labour which a man has undergone in the course of twenty-four hours may be approximately arrived at by an examination of the chemical changes which have taken place in his body; changed forms in matter indicating the anterior exercise of dynamical force. That muscular action is produced or supported by chemical change would probably now be a generally-accepted doctrine; but while many have thought that muscular power is derived from the oxidation of albuminous or nitrogenized substances, several recent researches seem to show that the latter is rather an accompaniment than a cause of the former, and that it is by the oxidation of carbon and hydrogen compounds that muscular force is supplied. Traube has been prominent in advancing this view, and experiments detailed in a paper published this year by two Swiss professsors, Drs. Fich and Wislicenus, which were made by and upon themselves in an ascent of the Faulhorn, have gone far to confirm it. Having fed themselves before and during the ascent, upon starch, fat, and sugar, avoiding all nitrogenized compounds, they found that the consumption of such food was amply sufficient to supply the force necessary for their expedition, and that they felt no exhaustion. By appropriate chemical examination, they ascertained that there was no notable increase in the oxidation of the nitrogenized constituents of the body. After calculating the mechanical equivalents of the combustion effected, they then state, as their first conclusion, that "The burning of protein substances cannot be the only source of muscular power, for we have here two cases in which men performed more measurable work than the equivalent of the amount of heat, which, taken at a most absurdly high figure, could be calculated to result from the burning of the albumen."

They further go on to state that, so far from the oxidation of albuminous substances not being the only source of muscular power, "the substances by the burning of which force is generated in the muscles are not the albuminous constituents of those tissues, but non-nitrogenous substances, either fats or hydrates of carbon," and that the burning of albumen is not in any way concerned in the production of muscular power.

We must not confuse the question of the food which gives permanent capability of muscular force with that which supplies its requisites for temporary activity; no doubt the carnivora are the most powerfully-constituted animals, but the chamois, gazelle, &c., have great temporary capacity for muscular exertion, though their food is vegetable; for concentrated and sustained energy, however, they do not equal the carnivora; and with the domestic graminivora we certainly find that they are capable of performing more work when supplied with those vegetables which contain the greatest quantity of nitrogen.

These and many similar classes of research show that in chemical inquiries, as in other branches of science, we are gradually relieving ourselves of hypothetical existences, which certainly had the advantage that they might be varied to suit the requirements of the theorist.

Phlogiston, as Lavoisier said with a sneer, was sometimes heavy, sometimes light; sometimes fire in a free state, sometimes combined; sometimes passing through glass vessels, sometimes

retained by them; which by its protean changes explained causticity and non-causticity, transparency and opacity, colours and their absence. As phlogiston and similar creations of the mind have passed away, so with hypothetic fluids, imponderable matters, specific ethers, and other inventions of entities made to vary according to the requirements of the theorist. I believe the day is approaching when these will be dispensed with, and when the two fundamental conceptions of matter and motion will be found sufficient to explain physical phenomena.

The facts made known to us by geological inquiries, while on the one hand they afford striking evidence of continuity, on the other, by the breaks in the record, may be used as arguments against it. The great question once was, whether these chasms represent sudden changes in the formation of the earth's crust, or whether they arise from dislocations occasioned since the original deposition of strata or from gradual shifting of the areas of submergence. Few geologists of the present day would, I imagine, not adopt the latter alternatives. Then comes a second question, whether, when the geological formation is of a continuous character, the different characters of the fossils represent absolutely permanent varieties, or may be explained by gradual modifying changes.

Professor Ansted, summing up the evidence on this head as applied to one division of stratified rocks, writes as follows: "Palæontologists have endeavoured to separate the Lias into a number of subdivisions, by the Ammonites, groups of species of those shells being characteristic of different zones. The evidence on this point rests on the assumption of specific differences being indicated by permanent modifications of the structure of the shell. But it is quite possible that these may mean nothing more than would be due to some change in the conditions of existence. Except between the Marlstone and the Upper Lias, there is really no palæontological break in the proper sense of the words; alterations of form and size consequent on the occurrence of circumstances more or less favourable, migration of species, and other well-known causes, sufficiently account for many of those modifications of the form of the shell that have been taken as specific marks. This view is strengthened by the fact that other shells and other organisms generally show no proof of a break of any importance except at the point already alluded to."

But, irrespectively of another deficiency in the geological record, which will be noticed presently, the physical breaks in the stratification make it next to impossible to fairly trace the order of succession of organisms by the evidence afforded by their fossil remains. Thus there are nine great breaks in the Palæozoic series, four in the Secondary, and one in the Tertiary, besides those between Palæozoic and Secondary and Secondary and Tertiary respectively. Thus in England there are sixteen important breaks in the succession of strata, together with a number of less important interruptions. But although these breaks exist, we find pervading the works of many geologists a belief, resulting from the evidence presented to their minds, sometimes avowed, sometimes unconsciously implied, that the succession of species bears some definite relation to the succession of strata. Thus Prof. Ramsay says that "in cases of superposition of fossiliferous strata, in proportion as the species are more or less continuous—that is to say, as the break in the succession of life is partial or complete—so was the time that elapsed between the close of the lower and the commencement of the upper strata a shorter or a longer interval. The break in life may be indicated not only by a difference in species, but yet more importantly by the absence of older and appearance of newer allied or unallied genera."

Indications of the connexion between cosmical studies and geological researches are dawning on us; there is, for instance, some reason to believe that we can trace many geological phenomena to our varying rotation round the sun; thus more than thirty years ago Sir J. Herschel proposed an explanation of the changes of climate on the earth's surface as evidenced by geological phenomena, founded on the changes of excentricity in the earth's orbit.

He said he had entered on the subject "impressed with the magnificence of that view of geological revolutions which regards them rather as regular and necessary efforts of great and general causes, then as resulting from a series of convulsions and catastrophes regulated by no laws and reducible to no fixed principles."

As the mean distance of the earth from the sun is nearly invariable, it would seem at first sight that the mean annual supply of light and heat received by the earth would also be invariable; but according to his calculations it is inversely proportional to the minor axis of the orbit; this would give less heat when the excentricity of the earth's orbit is approaching towards or at its minimum. Mr. Croll has recently shown reason to believe that the climate, at all events in the circumpolar and temperate zones of the earth, would depend on whether the winter of a given region occurred when the earth at its period of greatest excentricity was in aphelion or perihelion—if the former, the annual average of temperature would be lower, if the latter, it would be higher, than when the excentricity of the earth's orbit was less or approached more nearly to a circle. He calculates the difference in the amount of heat at the period of maximum excentricity of the earth's orbit to be as 19 to 26, according as the winter would take place when the earth was in aphelion or in perihelion. His reason may be briefly stated thus: assuming the mean annual heat to be the same, whatever the excentricity of orbit, yet if the extremes of heat and cold in winter and summer be greater, a colder climate will prevail, for there will be more snow and ice accumulated in the cold winter than the hot summer can melt, a result produced by the vapour (aided by the shelter from the sun's rays) suspended in consequence of the aqueous evaporation; hence we should get glacial periods, when the orbit of the earth is at its greatest excentricity, at those parts of the earth's surface where it is winter when the earth is in aphelion; carboniferous or hot periods where it is winter in perihelion; and normal or temperate periods when the excentricity of orbit is at a minimum; all these would gradually slide into each other, and would produce at long-distant periods alternations of cold and heat, several of which we actually observe in geological records.

If this theory be borne out, we should approximate to a test of the time which has elapsed between different geological epochs. Mr. Croll's computation of this would make it certainly not less than 100,000 years since the last glacial epoch, a time not very long in geological chronology—probably it is much more.

When we compare with the old theories of the earth, by which the apparent changes on its surface were accounted for by convulsions and cataclysms, the modern view inaugurated by Lyell, your former President, and now, if not wholly, at all events to a great extent adopted, it seems strange that the referring past changes to similar causes to those which are now in operation should have remained uninvestigated until the present century; but with this, as with other branches of knowledge, the most simple is frequently the latest view which occurs to the mind. It is much more easy to invent a *Deus ex machinâ* than to trace out the influence of slow continuous change; the love of the marvellous is so much more attractive than the patient investigation of truth, that we find it to have prevailed almost universally in the early stages of science.

In astronomy we had crystal spheres, cycles, and epicycles; in chemistry the philosopher's stone, the elixir vitæ, the archæus or stomach demon, and phlogiston; in electricity the notion that amber possessed a soul, and that a mysterious fluid could knock down a steeple. In geology a deluge or a volcano was supplied. In palæontology a new race was created whenever theory required it; how such new races began the theorist did not stop to inquire.

A curious speculator might say to a palæontologist of even recent date, in the words of Lucretius—

> Nam neque de cœlo cecidisse animalia possunt
> Nec terrestria de salsis exisse lacunis.
>
> . . . . .
>
> E nihilo si crescere possent,
> (Tum) fierent juvenes subito ex infantibus parvis,
> E terrâque exorta repente arbusta salirent;
> Quorum nihil fieri manifestum est, omnia quando
> Paulatim crescunt, ut par est, semine certo,
> Crescentesque genus servant;

—which may be thus freely paraphrased: "You have abandoned the belief in one primæval creation at one point of time, you cannot assert that an elephant existed when the first saurians roamed over earth and water. Without, then, in any way limiting Almighty power, if an elephant were created without progenitors, the first elephant must, in some way or other, have physically arrived on this earth. Whence did he come? Did he fall from the sky (*i.e.*, from the interplanetary space)? did he rise moulded out of a mass of amorphous earth or rock? did he appear out of the cleft of a tree? If he had no antecedent progenitors, some such beginning must be assigned to him." I know of no scientific writer who has, since the discoveries of geology have become familiar, ventured to present in intelligible terms any definite notion of how such an event could have occurred: those who do not adopt some view of continuity are content to say God willed it; but would it not be more reverent and more philosophical to inquire by observation and experiment, and to reason from induction and analogy, as to the probabilities of such frequent miraculous interventions?

I know I am touching on delicate ground, and that a long time may elapse before that calm inquiry after truth which it is the object of associations like this to promote can be fully attained; but I trust that the members of this body are sufficiently free from prejudice, whatever their opinions may be, to admit an inquiry into the general question whether what we term species are and have been rigidly limited, and have at numerous periods been created complete and unchangeable, or whether, in some mode or other, they have not gradually and indefinitely varied, and whether the changes due to the influence of surrounding circumstances, to efforts to accommodate themselves to surrounding changes, to what is called natural selection, or to the necessity of yielding to superior force in the struggle for existence, as maintained by our illustrious countryman Darwin, have not so modified organisms as to enable them to exist under changed conditions. I am not going to put forward any theory of my own; I am not going to argue in support of any special theory; but having endeavoured to show how, as science advances, the continuity of natural phenomena becomes more apparent, it would be cowardice not to present some of the main arguments for and against continuity as applied to the history of organic beings.

As we detect no such phenomenon as the creation or spontaneous generation of vegetables and animals which are large enough for the eye to see without instrumental assistance, as we have long ceased to expect to find a Plesiosaurus spontaneously generated in our fish-pond, or a Pterodactyle in our pheasant-cover, the field of this class of research has become identified with the field of the microscope, and at each new phase the investigation has passed from a larger to a smaller class of organisms. The question whether among the smallest and apparently the most elementary forms of organic life the phenomenon of spontaneous generation obtains, has recently formed the subject of careful experiment and animated discussion in France. If it could be found that organisms of a complex character were generated without progenitors out of amorphous matter, it might reasonably be argued that a similar mode of creation might obtain in regard to larger organisms. Although we see no such phenomenon as the formation of an animal such as an elephant, or a tree such as an oak, excepting from a parent which resembles it, yet if the microscope revealed to us organisms, smaller but equally complex, so formed without having been reproduced, it would render it not improbable that such might have been the case with larger organic beings. The controversy between M. Pasteur and M. Pouchet has led to a very close investigation of this subject, and the general opinion is that when such precautions are taken as exclude from the substance submitted to experiment all possibility of germs from the atmosphere being introduced, as by passing the air which is to support the life of the animalculæ through tubes heated to redness, and other precautions, no formation of organisms takes place. Some experiments of Mr. Child's, communicated to the Royal Society during the last year, again throw doubt on the negative results obtained by M. Pasteur; so that the question may be not finally determined, but the balance of experiment and opinion is against spontaneous generation.

One argument presented by M. Pasteur is well worthy of remark—viz., that in proportion as our means of scrutiny become more searching, heterogeny, or the development of organisms without generation from parents of similar organism, has been gradually driven from higher to lower forms of life, so that if some apparent exceptions still exist they are of the lowest and simplest forms, and these exceptions may probably be removed, as M. Pasteur considers he has removed them, by a more searching investigation.

If it be otherwise, if heterogeny obtains at all, all will now admit that at present the result of the most careful experiments shows it to be confined to the most simple organic structures, such as vibrions and bacteria, and that all the progressive and more highly-developed forms are, as far as the most enlarged experience shows, generated by reproduction.

The great difficulty which is met with at the threshold of inquiry into the origin of species, is the definition of species; in fact, species can

hardly be defined without begging the question in dispute.

Thus if species be said to be a perseverance of type, incapable of blending itself with other types, or, which comes nearly to the same thing, incapable of producing by union with other types offspring of an intermediate character which can again reproduce, we arrive at this result, that whenever the advocate of continuity shows a blending of what had been hitherto deemed separate species, the answer is, they were considered separate species by mistake, they do not now come under the definition of species, because they interbreed.

The line of demarcation is thus *ex hypothesi* removed a step further, and thus, unless the advocate of continuity can, on his side, prove the whole question in dispute, by showing that all can directly or by intermediate varieties reproduce, he is defeated by the definition itself of species.

On the other hand, if this, or something in fact amounting to it, be not the definition of species—if it be admitted that distinct species can, under certain favourable conditions, produce intermediate offspring capable of reproduction, then continuity in some mode or other is admitted.

The question then takes this form : Are there species or are there not? Is the word to be used as signifying a real, natural distinction, or as a mere convenient designation applied to subdivisions having a permanence which will probably outlive man's discussions on the subject, but not an absolute fixity? The same question, in a wider sense, and taking into consideration a much longer time, would be applicable to genera and families.

Actual experiment has done little to elucidate the question, nor, unless we can suppose the experiments continued through countless generations, is it likely to contribute much to its solution. We must therefore have recourse to the enlarged experience or induction from the facts of geology, palæontology, and physiology, aided by analogy from the laws of action which nature evidences in other departments.

The doctrine of gradual succession is hardly yet formularized, and though there are some high authorities for certain modifications of such view, the preponderance of authority would necessarily be on the other side. Geology and palæontology are recent sciences, and we cannot tell what the older authors would have thought or written had the more recently discovered facts been presented to their view. Authority, therefore, does not much help us on this question.

Geological discoveries seemed, in the early period of the science, to show complete extinction of certain species and the appearance of new ones, great gaps existing between the characteristics of the extinct and the new species. As science advanced, these were more or less filled up; the apparent difficulty of admitting unlimited modification of species would seem to have arisen from the comparison of the extreme ends of the scale, where the intermediate links or some of them were wanting.

To suppose a Zoophyte the progenitor of a Mammal, or to suppose at some particular period of time a highly-developed animal to have come out of nothing, or suddenly grown out of inorganic matter, would appear at first sight equally extravagant hypotheses. As an effort of Almighty creative power, neither of these alternatives presents more difficulty than the other; but as we have no means of ascertaining how creative power worked, but by an examination and study of the works themselves, we are not likely to get either side proved to ocular demonstration. A single phase in the progress of transmutation would probably require a term far transcending all that embraced by historical records; and on the other hand, it might be said, sudden creations, though taking place frequently, if viewed with reference to the immensity of time involved in geological periods, may be so rare with reference to our experience, and so difficult of clear authentication, that the non-observation of such instances cannot be regarded as absolute disproof of their possible occurrence.

The more the gaps between species are filled up by the discovery of intermediate varieties, the stronger becomes the argument for transmutation and the weaker that for successive creations, because the former view then becomes more and more consistent with experience, the latter more discordant from it. As undoubted cases of variation, more or less permanent, from given characteristics, are produced by the effects of climate, food, domestication, &c., the more species are increased by intercalation, the more the distinctions slide down towards those which are within the limits of such observed deviations; while on the other hand, to suppose the more and more frequent recurrence of fresh creations out of amorphous matter, is a multiplication of miracles or special interventions not in accordance with what we see of the uniform and gradual progress of nature, either in the organic or inorganic world. If we were entitled to conclude that the progress of discovery would continue in the same course, and that species would become indefinitely multiplied, the distinctions would become infinitely minute, and all lines of demarcation would cease, the polygon would become a circle, the succession of points a line. Certain it is that the more we observe, the more we increase the subdivision of species, and consequently the number of these supposed creations; so that new creations become innumerable, and yet of these we have no one well-authenticated instance, and in no other observed operation of nature have we seen this want of continuity, these frequent *per saltum* deviations from uniformity, each of which is a miracle.

The difficulty of producing intermediate offspring from what are termed distinct species, and the infecundity in many instances of hybrids, are used as strong arguments against continuity of succession; on the other hand, it may be said long-continued variation through countless generations has given rise to such differences of physical character, that reproduction is difficult in some cases and in others impossible.

Suppose, for instance, M to represent a parent race whose offspring by successive changes through eons of time have divaricated, and produced on the one hand a species A, and on the other a species Z, the changes here have been so great that we should never expect directly to reproduce an intermediate between A and Z. A and B on the one hand, and Y and Z on the other, might reproduce; but to regain the original type M, we must not only retrocede through all the intermediates, but must have similar circumstances recalled in an inverse order at each phase of retrogression, conditions which it is obviously impossible to fulfil. But though among the higher forms of organic structure we cannot retrace the effects of time and reproduce intermediate types, yet among some of the lower forms we find it difficult to assign any line of specific demarcation; thus as one result of the very elaborate and careful investigations of Dr. Carpenter on Foraminifera, he states, "It has been shown that a very wide range of variation exists among orbitolites, not merely as regards external form, but also as to plan of development; and not merely as to the shape and aspect of the entire organism, but also with respect to the size and configuration of its component parts. It would have been easy, by selecting only the most divergent types from amongst the whole series of specimens which I have examined, to prefer an apparently substantial claim on behalf of these to be accounted as so many distinct species. But after having classified the specimens which could be arranged around these types, a large proportion would yet have remained, either presenting characters intermediate between those of two or more of them, or actually combining those characters in different parts of their fabric; thus showing that no lines of demarcation can be drawn across any part of the series that shall definitely separate it into any number of groups, each characterized by features entirely peculiar to itself."

At the conclusion of his inquiry he states :—

I. The range of variation is so great among Foraminifera as to include not merely the differential characters which systematists proceeding upon the ordinary methods have accounted specific, but also those upon which the greater part of the genera of this group have been founded, and even in some instances those of its orders.

II. The ordinary notion of species as assemblages of individuals marked out from each other by definite characters that have been genetically transmitted from original proto-types similarly distinguished, is quite inapplicable to this group; since even if the limits of such assemblages were extended so as to include what elsewhere would be accounted genera, they would still be found so intimately connected by gradational links, that definite lines could not be drawn between them.

III. The only natural classification of the vast aggregate of diversified forms which this group contains will be one which ranges them according to their direction and degree of divergence from a small number of principal family types; and any subordinate grouping of genera and species which may be adopted for the convenience of description and nomenclature, must be regarded merely as assemblages of forms characterized by the nature and degree of the modifications of the original type, which they may have respectively acquired in the course of genetic descent from a common ancestry.

IV. Even in regard to these family types, it may fairly be questioned whether analogical evidence does not rather favour the idea of their derivation from a common original than that of their primitive distinctness.

Mr. H. Bates, when investigating "The Lepidoptera of the Amazon Valley," may almost be said to have witnessed the origin of some species of butterflies, so close have been his observations on the habits of these animals that have led to their variation and segregation, so closely do the results follow his observations, and so great is the impossibility of otherwise accounting for any of the observed facts.

In the numerous localities of the Amazon region certain gregarious species of butterfly (Heliconidea) swarm in incredible numbers, almost outnumbering all the other butterflies in the neighbourhood; the species in the different localities being different, though often to be distinguished by a very slight shade.

In these swarms are to be found, in small numbers, other species of butterflies belonging to as many as ten different genera, and even some moths; and these intruders, though they structurally differ *in toto* from the swarms they mingle with, and from one another, mimic the Heliconideæ so closely in colours, habits, mode of flight, &c., that it is almost impossible to distinguish the intruders from those they mingle with. The obvious benefit of this mimicry is safety, the intruders hence escaping detection by predatory animals.

Mr. Bates has extended his observations to the habits of life, food, variations, and geographical range of the species concerned in these mimetic phenomena, and finds in every case corroborative evidence of every variety and species being derivative, the species being modified from place to place to suit the peculiar form of Heliconidea stationed there.

Mr. Wallace has done similar service to the derivative theory by his observations and writings on the Butterflies and Birds of the Malay Archipelago, adducing instances of mimetic resemblances strictly analogous to the above; and adding in further illustration a beautiful series of instances where the form of the wing of the same butterfly is so modified, in various islets, as to produce changes in their mode of flight that tend to the conservation of the variety by aiding its escape when chased by birds or predacious insects.

He has also adduced a multitude of examples of geographical and representative species, races, and varieties, forming so graduated a series as to render it obvious that they have had a common origin.

The effect of food in the formation and segregation of races and of certain groups of insects has been admirably demonstrated by Mr. B. D. Walsh, of North America.

Mr. M'Donnell has been led to the discovery of a new organ in electric fishes from the application of the theory of descent, and Dr. Fritz Müller, has published numerous observations, showing that organs of very different structure may, through the operation of natural selection, acquire very similar and even identical functions. Sir John Lubbock's diving hymenopterous insect affords a remarkable illustration of analogous phenomena; it dives by the aid of its wings, and is the only insect of the vast order it belongs to that is at all aquatic.

The discovery of the Eozoon is of the highest importance in reference to the derivative hypothesis, occurring as it does in strata that were formed at a period inconceivably antecedent to the presupposed introduction of life upon the globe, and displacing the argument derived from the supposition that at the dawn of life a multitude of beings of high organization were simultaneously developed (in the Silurian and Cambrian strata).

Professor A. De Candolle, one of the most distinguished continental botanists, has, to some extent, abandoned the tenets held in his "Géographie Botanique," and favours the derivative hypothesis in his paper on the variation of oaks; following up a paper, by Dr. Hooker, on the oaks of Palestine, showing that some sixteen of them are derivative, he avows his belief that two-thirds of the 300 species of this genus, which he himself describes, are provisional only.

Dr. Hooker, who had only partially accepted the derivative hypothesis propounded before the publication of "The Origin of Species through Natural Selection," at the same time declining the doctrine of special creation, has since then cordially adopted the former, and illustrated its

principles by applying them to the solution of various botanical questions; first, in reference to the flora of Australia, the anomalies of which he appears to explain satisfactorily by the application of these principles; and, latterly, in reference to the Arctic flora.

In the case of the Arctic flora, he believes that originally Scandinavian types were spread over the high northern latitudes, that these were driven southwards during the glacial period, when many of them changed their forms in the struggle that ensued with the displaced temperate plants; that on the returning warmth, the Scandinavian plants, whether changed or not, were driven again northwards and up to the mountains of the temperate latitudes, followed, in both cases, by series of pre-existing plants of the temperate Alps. The result is the present mixed Arctic flora, consisting of a basis of more or less changed and unchanged Scandinavian plants, associated in each longitude with representatives of the mountain flora of the more temperate regions to the south of them.

The publication of a previously totally unknown flora, that of the Alps of tropical Africa, by Dr. Hooker, has afforded a multitude of facts that have been applied in confirmation of the derivative hypothesis. This flora is found to have relationships with those of temperate Europe and North Africa, of the Cape of Good Hope, and of the mountains of tropical Madagascar and Abyssinia, that can be accounted for on no other hypothesis but that there has been ancient climatal connexion and some coincident or subsequent slight changes of specific character.

The doctrine of Cuvier, every day more and more borne out by observation, that each organ bears a definite relation to the whole of the individual, seems to support the view of indefinite variation. If an animal seeks its food or safety by climbing trees, its claws will become more prehensile, the muscles which act upon those claws must become more developed, the body will become agile by the very exercise which is necessary to it, and each portion of the frame will mould itself to the wants of the animal by the effect on it of the habits of the animal.

Another series of facts which present an argument in favour of gradual succession, are the phases of resemblance to inferior orders which the embryo passes through in its development, and the relations shown in what is termed the metamorphosis of plants; facts difficult to account for on the theory of frequent separate creations, but almost inevitable on that of gradual succession. So, also, the existence of rudimentary and effete organs, which must either be referred to a *lusus naturæ* or to some mode of continuous succession.

The doctrine of typical nuclei seems only a mode of evading the difficulty; experience does not give us the types of theory, and, after all, what are these types? It must be admitted there are none such in reality; how are we led to the theory of them? simply by a process of abstraction from classified existences. Having grouped from natural similitudes certain natural forms into a class, we select attributes common to each member of the class, and call the assemblage of such attributes a type of the class. This process gives us an abstract idea, and we then transfer this idea to the Creator, and make him start with that which our own imperfect generalization has derived. It seems to me that the doctrine of types is, in fact, a concession to the theory of continuity or indefinite variability; for the admission that large groups have common characters, shows, necessarily, a blending of forms within the scope of the group, which supports the view of each member being derived from some other member of it: can it be asserted that the assigned limits of such groups have a definite line of demarcation?

The condition of the earth's surface, or, at least, of large portions of it, has for long periods remained substantially the same; this would involve a greater degree of fixity in the organisms which have existed during such periods of little change than in those which have come into being during periods of more rapid transition; for, though rejecting catastrophes as the general *modus agendi* of nature, I am far from saying that the march of physical changes has been always perfectly uniform.

There have been doubtless what may be termed secular seasons, and there have been local changes of varying degrees of extent and permanence; from such causes organized beings would be more concentrated in certain directions than in others, the fixity of character being in the ratio of the fixity of condition. This would throw natural forms into certain groups which would be more prominent than others, like the colours of the rainbow, which present certain predominant tints, though they merge into each other by insensible gradations.

While the evidence seems daily becoming stronger in favour of a derivative hypothesis as applied to the succession of organic beings, we are far removed from anything like a sufficient number of facts to show that, at all events within the existing geological periods capable of being investigated, there has been any great progression from a simpler or more embryonic to a more complex type.

Professor Huxley, though inclined to the derivative hypothesis, shows, in the concluding portion of his address to the Geological Society, 1862, a great number of cases in which, though there is abundant evidence of variation, there is none of progression. There are, however, several groups of vertebrata in which the endoskeleton of the older presents a less ossified condition than that of the younger genera. He cites the Devonian Ganoids, the Mesozoic Lepidosteidæ, the Palæozoic Sharks, and the more ancient Crocodilia and Lacertilia, and particularly the Pycnodonts and Labyrinthodonts, as instances of this when compared with their more recent representatives.

The records of life on the globe may have been destroyed by the fusion of the rocks, which would otherwise have preserved them, or by crystallization after hydrothermal action. The earlier forms may have existed at a period when this planet was in course of formation, or being segregated or detached from other worlds or systems. We have not evidence enough to speculate on the subject, but by time and patience we may acquire it.

Were all the forms which have existed, embalmed in rock, the question would be solved; but what a small proportion of extinct forms is so preserved, and must be, if we consider the circumstances necessary to fossilize organic remains. On the dry land, unwashed by rivers and seas, when an animal or plant dies, it undergoes chemical decomposition which changes its form; it is consumed by insects, its skeleton is oxidized and crumbles into dust. Of the myriads of animals and vegetables which annually perish, we find hardly an instance of a relic so preserved as to be likely to become a permanent fossil. So again in the deeper parts of the ocean, or of the larger lakes, the few fish there are perish and their remains sink to the bottom, and are there frequently consumed by other marine or lacustrine organisms or chemically decomposed. As a general rule, it is only when the remains are silted up by marine fluviatile or lacustrine sediments that the remains are preserved. Geology therefore might be expected to keep for us such organic remains only as were likely to inhabit deltas or the margins of seas, lakes, or rivers; here and there an exception may occur, but the mass of preserved relics would be those of creatures so situated; and so we find it, the bulk of fossil remains consists of fish and amphibia, shell-fish form the major part of the geological museum, limestone and chalk rocks frequently consisting of little else than a congeries of fossil shells. Plants of reed or rush-light character, fish which are capable of inhabiting shallow waters, and Saurian animals, form another large portion of geological remains.

Compare the shell-fish and amphibia of existing organisms with the other forms, and what a small proportion they supply; compare the shell-fish and amphibia of Palæontology with the other forms, and what an overwhelming majority they yield.

There is nothing, as Professor Huxley has remarked, like an extinct order of birds or mammals, only a few isolated instances. It may be said the ancient world possessed a larger proportion of fish and amphibia, and was more suited to their existence. I see no reason for believing this, at least to anything like the extent contended for; the fauna and flora now in course of being preserved for future ages would give the same idea to our successors.

Crowded as Europe is with cattle, birds, insects, &c., how few are geologically preserved! while the muddy or sandy margins of the ocean, the estuaries, and deltas are yearly accumulating numerous crustacea and mollusca, with some fishes and reptiles, for the study of future palæontologists.

If this position be right, then, notwithstanding the immense number of preserved fossils, there must have lived an immeasurably larger number of unpreserved organic beings, so that the chance of filling up the missing links, except in occasional instances, is very slight. Yet where circumstances have remained suitable for the preservation, many closely-connected species are preserved—in other words, while the intermediate types in certain cases are lost, in others they exist. The opponents of continuity lay all stress on the lost and none on the existing links.

But there is another difficulty in the way of tracing a given organism to its parent form, which, from our conventional mode of tracing genealogies, is never looked upon in its proper light.

Where are we to look for the remote ancestor of a given form? Each of us, supposing none of our progenitors to have intermarried with relatives, would have had at or about the period of the Norman Conquest upwards of a hundred million direct ancestors of that generation, and if we add the intermediate ancestors, double that number. As each individual has a male and female parent, we have only to multiply by two for each thirty years, the average duration of a generation, and it will give the above result.

Let any one assume that one of his ancestors at the time of the Norman Conquest was a Moor, another a Celt, and a third a Laplander, and that these three were preserved while all the others were lost, he would never recognize either of them as his ancestor, he would only have the one-hundred millionth of the blood of each of them, and as far as they were concerned there would be no perceptible sign of identity of race.

But the problem is more complex than that which I have stated. At the time of the Conquest there were hardly a hundred million people in Europe. It follows that a great number of the ancestors of the *propositus* must have intermarried with relations, and then the pedigree, going back to the time of the Conquest, instead of being represented by diverging lines, would form a network so tangled that no skill could unravel it; the law of probabilities would indicate that any two people in the same country, taken at hazard, would not have many generations to go back before they would find a common ancestor, who probably, could they have seen him or her in the life, had no traceable resemblance to either of them. Thus two animals of a very different form, and of what would be termed very different species, might have a common geological ancestor, and yet the skill of no comparative anatomist could trace the descent.

From the long-continued conventional habit of tracing pedigrees through the male ancestor, we forget in talking of progenitors that each individual has a mother as well as a father, and there is no reason to suppose that he has in him less of the blood of the one than of the other.

The recent discoveries in palæontology show us that man existed on this planet at an epoch far anterior to that commonly assigned to him. The instruments connected with human remains, and indisputably the work of human hands, show that to these remote periods the term civilization could hardly be applied—chipped flints of the rudest construction, probably, in the earlier cases, fabricated by holding an amorphous flint in the hand and chipping off portions of it by striking it against a larger stone or rock: then as time suggested improvements, it would be more carefully shaped, and another stone used as a tool; then (at what interval we can hardly guess) it would be ground, then roughly polished, and so on: subsequently bronze weapons, and, nearly the last before we come to historical periods, iron. Such an apparently simple invention as a wheel must, in all probability, have been far subsequent to the rude hunting-tools or weapons of war to which I have alluded.

A little step-by-step reasoning will convince the unprejudiced that what we call civilization must have been a gradual process. Can it be supposed that the inhabitants of Central America or of Egypt suddenly, and what is called instinctively, built their cities, carved and ornamented their monuments? If not, if they must have learned to construct such erections, did it not take time to acquire such learning, to invent tools as occasion required, contrivances to raise weights, rules or laws by which men acted in concert to effect the design? Did not all this require time? and if, as the evidence of historical times shows, invention marches with a geometrical progression, how slow must have been the earlier steps! If even now habit, and prejudice resulting therefrom, vested interests, &c., retard for some time the general application of a new invention, what must have been the degree of retardation among the comparatively uneducated beings which then existed?

I have, of course been able to indicate only a few of the broad arguments on this most interesting subject; for detailed results, the works of Darwin, Hooker, Huxley, Carpenter, Lyell, and others must be examined. If I appear to lean to the view that the successive changes in organic beings do not take place by sudden leaps, it is, I believe, from no want of an impartial feeling; but if the facts are stronger in favour of one theory than

another, it would be an affectation of impartiality to make the balance appear equipoised.

The prejudices of education and associations with the past are against this, as against all new views; and while on the one hand a theory is not to be accepted because it is new and *primâ facie* plausible, still to this assembly I need not say that its running counter to existing opinions is not necessarily a reason for its rejection; the *onus probandi* should rest on those who advance a new view, but the degree of proof must differ with the nature of the subject. The fair question is, Does the newly-proposed view remove more difficulties, require fewer assumptions, and present more consistency with observed facts, than that which it seeks to supersede? If so, the philosopher will adopt it, and the world will follow the philosopher—after many days.

It must be borne in mind that even if we are satisfied, from a persevering and impartial inquiry, that organic forms have varied indefinitely in time, the *causa causans* of these changes is not explained by our researches; if it be admitted that we find no evidence of amorphous matter suddenly changed into complex structure, still why matter should be endowed with the plasticity by which it slowly acquires modified structure is unexplained. If we assume that natural selection, or the struggle for existence, coupled with the tendency of like to reproduce like, gives rise to various organic changes, still our researches are at present uninstructive as to why like should produce like, why acquired characteristics in the parent should be reproduced in the offspring. Reproduction itself is still an enigma, and this great question may involve deeper thoughts than it would be suitable to enter upon now.

Perhaps the most convincing argument in favour of continuity which could be presented to a doubting mind would be the difficulty it would feel in representing to itself any *per saltum* act of nature. Who would not be astonished at beholding an oak tree spring up in a day, and not from seed or shoot? We are forced by experience, though often unconsciously, to believe in continuity as to all effects now taking place; if any one of them be anomalous, we endeavour, by tracing its history and concomitant circumstances, to find its cause—*i.e.*, to relate it to antecedent phenomena. Are we then to reject similar inquiries as to the past? is it laudable to seek an explanation of present changes by observation, experiment, and analogy, and yet reprehensible to apply the same mode of investigation to the past history of the earth and of the organic remains embalmed in it?

If we disbelieve in sudden creations of matter or force, in the sudden formations of complex organisms now, if we now assign to the heat of the sun an action enabling vegetables to live by assimilating gases and amorphous earths into growing structures, why should such effects not have taken place in earlier periods of the world's history, when the sun shone as now, and when the same materials existed for his rays to fall upon?

If we are satisfied that continuity is a law of nature, the true expression of the action of Almighty Power, then, though we may humbly confess our inability to explain why matter is impressed with this gradual tendency to structural formation, we should cease to look for special interventions of creative power in changes which are difficult to understand, because, being removed from us in time, their concomitants are lost; we should endeavour from the relics to evoke their history; and when we find a gap not try to bridge it over with a miracle.

If it be true that continuity pervades all physical phenomena, the doctrine applied by Cuvier to the relations of the different parts of an animal to each other might be capable of great extension. All the phenomena of inorganic and organized matter might be expected to be so inter-related, that the study of an isolated phenomenon would lead to a knowledge of numerous other phenomena with which it is connected. As the antiquary deduces from a monolith the tools, the arts, the habits, and epoch of those by whom it is wrought, so the student of science may deduce from a spark of electricity or a ray of light the source whence it is generated; and by similar processes of reasoning other phenomena hitherto unknown may be deduced from their probable relation with the known. But, as with heat, light, magnetism, and electricity, though we may study the phenomena to which these names have been given, and their mutual relations, we know nothing of what they are: so, whether we adopt the view of natural selection, of effort, of plasticity, &c., we know not why organisms should have this *nisus formativus*, or why the acquired habit or exceptional quality of the individual should re-appear in the offspring.

Philosophy ought to have no likes or dislikes, truth is her only aim; but if a glow of admiration be permitted to a physical inquirer, to my mind a far more exquisite sense of the beautiful is conveyed by the orderly development, by the necessary inter-relation and inter-action of each element of the cosmos, and by the conviction that a bullet falling to the ground changes the dynamical conditions of the universe, than can be conveyed by mysteries, by convulsions, or by cataclysms.

The sense of understanding is to the educated more gratifying than the love of the marvellous, though the latter need never be wanting to the nature-seeker.

But the doctrine of continuity is not solely applicable to physical inquiries.

The same modes of thought which lead us to see continuity in the field of the microscope as in the universe, in infinity downwards as in infinity upwards, will lead us to see it in the history of our own race; the revolutionary ideas of the so-called natural rights of man, and *à priori* reasoning from what are termed first principles, are far more unsound, and give us far less ground for improvement of the race, than the study of the gradual progressive changes arising from changed circumstances, changed wants, changed habits. Our language, our social institutions, our laws, the Constitution of which we are proud, are the growth of time, the product of slow adaptations, resulting from continuous struggles. Happily in this country, though our philosophical writers do not always recognize it, practical experience has taught us to improve rather than to remodel; we follow the law of nature and avoid cataclysms.

The superiority of Man over other animals inhabiting this planet, of civilized over savage man, and of the more civilized over the less civilized, is proportioned to the extent which his thought can grasp of the past and of the future. His memory reaches further back, his capability of prediction reaches further forward, in proportion as his knowledge increases. He has not only personal memory which brings to his mind at will the events of his individual life,—he has history, the memory of the race; he has geology, the history of the planet; he has astronomy, the geology of other worlds. Whence does the conviction to which I have alluded, that each material form bears in itself the records of its past history, arise? Is it not from the belief in continuity? Does not the worn hollow on the rock record the action of the tide, its stratified layers the slow deposition by which it was formed, the organic remains imbedded in it the beings living at the times these layers were deposited, so that from a fragment of stone we can get the history of a period of myriads of years ago? From a fragment of bronze we may get the history of our race at a period antecedent to tradition. As science advances our power of reading this history improves and is extended. Saturn's ring may help us to a knowledge of how our solar system developed itself, for it as surely contains that history as the rock contains the record of its own formation.

By this patient investigation how much have we already learned, which the most civilized of ancient human races ignored! While in ethics, in politics, in poetry, in sculpture, in painting, we have scarcely, if at all, advanced beyond the highest intellects of ancient Greece or Italy, how great are the steps we have made in physical science and its applications!

But how much more may we not expect to know?

We, this evening assembled, Ephemera as we are, have learned, by transmitted labour, to weigh, as in a balance, other worlds larger and heavier than our own, to know the length of their days and years, to measure their enormous distance from us and from each other, to detect and accurately ascertain the influence they have on the movements of our world and on each other, and to discover the substances of which they are composed; may we not fairly hope that similar methods of research to those which have taught us so much may give our race further information, until problems relating not only to remote worlds, but possibly to organic and sentient beings which may inhabit them, problems which it might now seem wildly visionary to enunciate, may be solved by progressive improvements in the modes of applying observation and experiment, induction and deduction?

REPORTS.

REPORT OF THE KEW COMMITTEE.

The Committee of the Kew Observatory submit to the Council of the British Association the following statement of their proceedings during the past year:—

A Unifilar and Dip Circle for Captain J. Belavenetz, of the Russian Navy, Director of the Compass Observatory at Cronstadt, have been verified at Kew Observatory and forwarded to Russia.

Three Unifilars and three Dip Circles, ordered by Colonel Strange for the Indian Survey, have been verified.

Dr. Kirk, who has gone out to Zanzibar on the African coast, has received instruction at Kew Observatory; and a Dip Circle, a Unifilar, and an Azimuth Compass have been verified for him, and await his directions.

In consequence of a representation from Mr. C. Chambers, Acting Superintendent of the Observatory, Bombay, a correspondence has taken place between the Director of the India Store Department and the Chairman of the Kew Committee, the result of which is that the Committee have superintended the construction of an Anemometer, a Dip Circle, and a Unifilar for the Bombay Observatory. These instruments have been verified, and are now in the hands of the India Board for transmission to their destination.

The Admiralty have ordered a Unifilar and a Dip Circle for Captain Mayne, of Her Majesty's ship Nassau, who is about to proceed to the Straits of Magellan; these instruments have been verified at Kew Observatory, where Captain Mayne and several of his officers have likewise received instruction in magnetism.

Dr. Buys-Ballot has ordered a Declination Magnetograph, which has been constructed by Mr. Adie, and forwarded to Utrecht, where it has safely arrived.

A set of Self-recording Magnetographs and also a Barograph have been ordered by the Stonyhurst Observatory; and the Rev. Walter Sidgreaves has been at the Observatory, receiving instruction in magnetism. The Self-recording Magnetographs for Stonyhurst have been verified and dispatched to their destination.

The set of self-recording instruments ordered by Mr. Meldrum, of the Mauritius Observatory, are at present at Kew; Mr. Meldrum intends to visit the Kew Observatory for the purpose of making himself further acquainted with the process of observing and deducing results previous to his return to the Mauritius.

Mr. Ellery, of Melbourne Observatory, has likewise ordered a set of Self-recording Magnetographs. These have been constructed by Mr. Adie, and will be taken to Kew for verification, when the set for Mauritius have been removed.

Professor Smirnow (from Kasan) has received instructions in magnetism at the Observatory.

The usual monthly absolute determinations of the magnetic elements continue to be made by Mr. Whipple, Magnetical Assistant, and the self-recording magnetographs are in constant operation as heretofore, also under Mr. Whipple, who has displayed his usual care and assiduity in the discharge of his duties.

The photographic department connected with the self-recording instruments is under the charge of Mr. Page, who performs his duties very satisfactorily.

A stoneware stove free from iron has been erected in the room containing the Kew magnetographs, and by its means this room has been heated through a range of 20° Fahr., in order to determine the temperature correction of the horizontal and vertical force magnetographs. The observations for this purpose are being reduced.

The meteorological work of the Observatory continues in charge of Mr. Baker, who executes his duties very satisfactorily.

Since the Birmingham Meeting 126 barometers have been verified. 395 thermometers have likewise been verified, and eight standard thermometers constructed at the Observatory.

The self-recording Barograph continues in constant operation; and traces in duplicate are obtained, one set of which is regularly forwarded to the meteorological department of the Board of Trade.

An arrangement for a self-recording thermograph has been devised by the Superintendent and by Mr. Beckley, and, as a preliminary experiment, gave a very satisfactory curve, the instrument is now being arranged in a suitable site.

The instruments used by the late Mr. Appold for regulating the temperature and moisture of his apartments have been forwarded by the Royal Society to the Kew Observatory.

The Indian pendulum observations are in active progress. Both Colonel Walker and Captain Basevi are in correspondence with the

Observatory in discussing questions relating to this work.

The Superintendent has received 100*l.* from the Government Grant Committee of the Royal Society for preliminary observation with Captain Kater's pendulum. These preliminary observations are in progress under the charge of Mr. Loewy as observer, and have the following points in view :—

(1) To see by the general agreement or non-agreement of the observations with each other whether Captain Kater's pendulum is still in a state to justify its adoption as an instrument to give a correct determination of the length of the seconds' pendulum.

(2) To determine the true temperature correction of the pendulum.

(3) To use Kater's pendulum, and also the Royal Society's invariable pendulum No. 8, for the purpose of determining a curve of correction for atmospheric pressure, from inch to inch, at low pressures.

The Superintendent has received 50*l.* from the Government Grant Fund of the Royal Society, to pursue the experiments on a rotating disk.

The Kew Heliograph, in charge of Mr. De la Rue, continues to be worked in a very satisfactory manner. During the past year 282 negatives have been taken on 158 days, and the usual number of positives have been printed from them.

Since the last meeting of the Association, the first set of the results obtained by this instrument have been published at the expense of Mr. De la Rue, under the following title : "Researches on Solar Physics, by Warren De la Rue, B. Stewart, and B. Loewy ; first series ; On the Nature of Sunspots."

The present progress of the work of reduction will best be seen from the following letter, written by Mr. De la Rue, in answer to a request made through the Astronomer Royal by Padre Secchi, to know what was doing in this country in the subject of Heliography :—

"110, Bunhill Row, August 8, 1866.

"My dear Sir,—In reference to the extract from Padre Secchi's letter, I beg to supply the following information :—

"The pictures taken by means of the Kew Heliograph are all measured by means of my Micrometer ; the positions of the spots are then reduced to distances in terms (fractional parts) of the sun's radius, and the angles of position corrected for any error in the position of the wires.

"Pictures of the Pagoda are taken from time to time, and the measurements of the various galleries of the Pagoda serve to determine the optical distortion of the Sun's image, and the corrections to be applied to the Sun-pictures.

"The heliocentric latitudes and longitudes of the spots are then calculated.

"The areas of the spots and the penumbra are also measured, and the areas corrected for perspective are tabulated in terms (fractional parts) of the area of the sun's disk.

"The areas of the spots, &c., on all of Carrington's original pictures have recently been measured, and an account of these measurements will be shortly published.

"Padre Secchi will be able to judge, from the foregoing statement, whether it will be worth while to undertake the work he proposes.

"The measurements obtainable from photographs are much more reliable than those from projected images.—I am, yours very truly,

(Signed) WARREN DE LA RUE.

"E. J. Stone, Esq."

The Association will regret to learn the deaths of Dr. Sabler and M. Gussew, in consequence of which the Wilna Heliograph is not at work.

M. Smysloff of the Pulkowa Observatory has been appointed Director of the Wilna Observatory, by the Imperial Academy of Sciences of St. Petersburg. M. O. Struve having asked for information respecting the working of the Heliograph, it has been suggested to him by the Kew Committee that it would be advisable for M. Smysloff to visit the Kew Observatory, to see the instrument in operation.

The sun-spots continue to be observed after the method of Hofrath Schwabe, of Dessau, and the valuable collection of drawings lent by this eminent observer remains at the Observatory. These have been supplemented by the beautiful series of detailed drawings of spots made by the Rev. F. Howlett, which that gentleman has deposited at Kew.

The apparatus for verifying sextants alluded to in last report has now been constructed by Mr. Cook, and is being erected at the Observatory.

About three-fourths of the region of the solar spectrum between E and F has been mapped by the spectroscope belonging to the Chairman. The spectroscope is now in London, the work appertaining to the staff at the Observatory not permitting sufficient time for further observation with this instrument.

The instrument devised by Mr. Broun for the purpose of estimating the magnetic dip by means of soft iron, remains at present at the Observatory, awaiting Mr. Broun's return to England.

The Superintendent has received grants from the Royal Society for special experiments ; and when these are completed, an account will be rendered to that society.

The report of a committee appointed to consider certain questions relating to the Meteorological Department of the Board of Trade, and presented to both Houses of Parliament by command of Her Majesty, has been communicated to the members of the Kew Committee, and has been otherwise widely circulated among the meteorologists of the British Association : the object of the report is expressed in the following terms :—

"Upon the death of the late Admiral Fitzroy, a correspondence took place between the Board of Trade and the Royal Society with respect to the Meteorological Department of the Board of Trade. The result of that correspondence was the appointment of a Committee, consisting of the following gentlemen, viz. : Francis Galton, Esq., F.R.S., General Secretary of the British Association for the Advancement of Science, nominated by the President and Council of the Royal Society ; Staff Commander Evans, R.N., F.R.S., Chief Naval Assistant to the Hydrographer of the Admiralty, by the Admiralty ; T. H. Farrer, Esq., one of the Secretaries to the Board of Trade, by the Board of Trade,—to consider and report upon the following questions :—

"1. What are the data, especially as regards Meteorological Observations at sea, already collected by and now existing in the Meteorological Department of the Board of Trade ?

"2. Whether any, and what steps should be taken for arranging, tabulating, publishing, or otherwise making use of such data.

"3. Whether it is desirable to continue Meteorological Observations at sea, and if so, to what extent, and in what manner.

"4. Assuming that the system of Weather Telegraphy is to be continued, can the mode of carrying it on and publishing the results be improved ?

"5. What staff will be necessary for the above purposes ?"

The authors of the report arrive at the following conclusions in respect to the ocean statistics, weather telegraphy, foretelling weather, and observations affecting weather in the British Isles.

"The collection of observations from the captains of ships is a function which can probably best be performed through the medium of such agencies as a Government office can command, and which was in fact well performed by the Meteorological Department before its attention was devoted to the practice of foretelling weather. We assume, therefore, that this function will remain with the Board of Trade.

"The digesting and tabulating results of observations is, on the other hand, a function which requires a large knowledge of what the state of the science for the time being requires, as well as exact scientific method.

"This function is one that has not been satisfactorily performed by the Meteorological Department. And we believe that it would be much better, as well as more economically performed, under the direction of a scientific body—such as a Committee of the Royal Society, or of the British Association, if furnished with the requisite funds by Government—than it will be if left to a Government Department. The establishment already existing at Kew might probably be easily developed, so as to carry into effect such a purpose. It would in that case become a meteorological centre, to which all observations of value (by British observers), made on land or at sea, and whether within the British Isles or not, would be sent for discussion and reduction. We have therefore in the following estimates, assumed that all meteorological observations made on land, whether at the stations recommended by the Royal Society, or at the lighthouses or coastguard stations, as well as all observations at sea, shall be referred to and discussed under the direction of such a scientific body as we have mentioned ; and we have also assumed that the aid afforded by Government would be in the shape of an annual vote so made as to leave the Royal Society, or other scientific body charged with the duty, perfectly free in their method and in their choice of labour, but upon the condition that an account shall be rendered to Parliament of the money spent, and of the results effected in each year."

The Kew Committee have examined this Report, and, speaking in general terms, they cordially acquiesce in the conclusions of its authors. They consider the proposed arrangement to fall within the competence of the Kew Observatory.

In the last Kew Report it was stated that many experiments and observations of a nature to advance science are made by the Committee under the sanction of the Association, the cost of each being defrayed by the promoters.

The Committee consider that the suggested observations contained in the Government report which has been referred to would be merely an extension of the usual practice of the Observatory ; but in consideration of the magnitude of the work proposed, they suggest that the Council should bring the subject before the General Committee, with the view of the Kew Committee being authorized to discuss and make the necessary arrangements with the Board of Trade, should any proposal be made.

The Committee are also desirous of bringing under the consideration of the Council, the expediency of proceeding in the formation of a memoir on the periodic and non-periodic variations of the temperature at Kew, as a normal station of British meteorology. Similar works have for some years past occupied the attention of the most eminent amongst the Continental meteorologists as being in fact the foundation of all *scientific* knowledge of the climatology of their respective countries. A memoir on the periodic and non-periodic variations of the temperature at the magnetical and meteorological observatory at Toronto in Canada has been printed in the Philosophical Transactions for 1853, but no such work has yet been systematically undertaken at Kew, although it is quite in accordance with the objects for which the observatory was instituted, in familiarizing British meteorologists with a system of tabulation they have hitherto unduly neglected. Daily photograms taken from the thermograph constructed under Mr. Stewart's direction, will supply in the most unexceptionable manner the observational basis on which the memoir would be founded.

To obtain such photograms would constitute a very small addition to the duties of the assistant, by whom the daily photograms of the magnetical instruments are taken. The *tabulation* from the daily photograms of the temperature would be the only increase of any moment to the ordinary present work of the Observatory, and would require, possibly, the part services of an additional young assistant.

The tabulation would supply twenty-four equidistant entries in every solar-day. The tables containing these entries, together with the Photograms, after careful inspection by a proper authority would be preserved for subsequent use. Five, or at most six years would constitute quite a sufficient basis for the determination of the periodic variations forming the first part of the proposed work, and would require about a couple of months of superintending care on the part of the person who might be director of the Observatory, when the observations of the five or six years should have accumulated.

Nothing more than ordinary clerk's work under such general superintendence would be required.

Should the Board of Trade be disposed to avail itself of the suggestion which has been made to them in respect to the Kew Observatory, the publication which has been suggested would become one of its first important duties.

J. P. GASSIOT, Chairman.

Kew Observatory, August 17, 1866.

The balance-sheet attached to the Report shows a small balance on the right side.

MISCELLANEA.

M. CHEVREUL, in a communication addressed to the French Academy last Monday week, brings together some curious facts relative to the Age of Stone in China. It seems that when Confucius was staying in the Kingdom of Tchen, a bird of prey fell dead before the King. Upon examination, it was found to have been killed by an arrow armed with a hard sharp stone. Confucius was called upon to explain this, and related the tradition that in the year 1122 B.C., such a weapon had been presented as a token of sovereignty by Ou-ouang to the first King of

Tchen. Search was made in the Royal Museum, and the weapon was discovered. "This proves," says M. Chevreul, "that even at that remote epoch iron weapons had already been introduced into China, and the Stone Age only lived in tradition." M. Stanislas Julien has confirmed this opinion by several extracts from Chinese encyclopædias, which put the existence of a Stone Age in China beyond doubt.

Mr. W. W. Skeat is at work on a new edition of "Piers Plowman." He has examined nearly thirty MSS., and considers that there are *three* distinct types or forms of the poem. He proposes to publish one of each in order (with various readings), beginning with the earliest and shortest. Meanwhile he appeals to all students who have made notes upon any theological, philological, or historical points connected with the poem to assist him.

A beautiful edition of the elder Disraeli's "Curiosities of Literature" has just been published by Messrs. Routledge for three shillings and sixpence. A better book for the seaside bench or beach will not readily be found.

A Life of Fray Luis de Leon in German has just been published at Halle. (London: Williams and Norgate). Born at Belmont in 1527, he was one of those Catholics who tried to stem the progress of the Reformation by a reform of the Church itself. Though he did not escape persecution, he avoided any condemnation for heresy, and died in 1591, General-Vicar of the Order of St. Augustine. Some of his poems are now given to the world for the first time; and from among them we select this elegant translation of the *Integer vitæ*:—

El hombre justo y bueno,
El que de culpa esta y mancilla puro,
Las manos en el seno,
Sin dardo ni zagaya va seguro
Y sin llevar cargada
La aljaba de saeta enherbolada.

O vaya por la arena
Ardiente de la Libia ponzoñosa,
O vaya por do suena
De Hidaspes la corriente fabulosa,
O por la tierra cruda,
De nieve llena y de piedad desnuda;

De mi se que al encuentro
Mientras por la montaña vagueando,
Mas de lo justo entro
Sin armas, y de Lalaje encantado,
Me vido, y mas ligero
Que rayo huyó un lobo carnicero;

Y creo, que alimaña
Mas fiera y espantosa no mantiene
La mas alta Alemaña
En sus espesos bosques, ni la tiene
La tierra donde mora
El moro, de fiereza engendra dora.

O ya en aquella parte
Que siempre está sujeta al inclemente
Cielo, do no se parte
Espesa y fria niebla eternamente,
Do arbol no se vé
Ni soplo do aire blando que le orce;

O ya me ponga alguno
En la region al sol mas alegada,
Do no vive ninguno
Saempre será de mi Lalage amada,
La del reir gracioso
La del parlar mas que miel sabroso.

The influence of the Positive Philosophy is permeating society to a degree few of us are aware of. The *Times* in a leader of last Tuesday, says, "Had one-half of the time and research devoted to sidereal astronomy been spent in observing and registering changes which anyone may notice . . . meteorology would not be still in its infancy." The invectives of Comte against the inutility of sidereal astronomy are well known. They have met with few defenders amongst the devotees of pure science. Truly the genius of one age is the staple of the next.

Mr. G. H. Lewes's "Life and Works of Goethe" has met with a sharp critic in Dr. Kreyenberg, of Dantzic, who finds that the chief merit of the book is "its style, a pleasing smooth manner of sometimes perverting facts," and that it "shows no traces of a philosophical knowledge of the true spirit and intent of Goethe's writings," and does not treat his scientific writings with accuracy. "It is, moreover, not true" when Lewes says "of all idylls the 'Herman and Dorothea' is the most truly idyllic! For nobody ever doubted that Goethe's 'Herman and Dorothea' was *no idyll at all*. It is equally as far from fact when Lewes affirms, 'Of all poems describing country life and country people it is the most truthful,' since it describes neither country life nor country people." But one of Lewes's greatest blunders is contained in the following assertion: "One feels that the invigorating breezes of Ilmenau, where in a space of six months this poem was mainly composed, have roused the poet out of the flaccid moods of prose, and given him all his quiet strength." Now the poem in question was not composed in Ilmenau; but the outline, and also the principal part of it, were written in a single month at Jena—namely, the month of September, 1796, not then in six months. Moreover it was finished, as can be shown, neither in Ilmenau, nor within a space of six months, but in Jena, Weimar, and upon the Leipzig-Dessauer journey, during a space of more than eight months, including a part of June, 1797; so that it is difficult to see how Lewes could have adopted the above-mentioned idea, unless from a suggestion given by the work of Viehoff to the effect that Goethe during his sojourn in Ilmenau in 1795 had busied himself with this subject. Dr. Kreyenberg considers that Lewes has borrowed largely from Viehoff, Schaefer, and Stahr, without due acknowledgment, and then sneered covertly at them. Dr. Kreyenberg also quotes Gervinus's condemnation of Lewes's absurdity in reproaching Goethe for believing in the joke that he wrote about the constellation at his birth.

The *Pall Mall Gazette* is the only journal besides ourselves which has had the courage to praise what is really good in Swinburne's "Poems and Ballads," and to affirm that he has made progress beyond "Atalanta in Calydon." We have indicated the direction in which his strength lies. He is, though that is denied by our contemporary, essentially a Pagan, perhaps not so much in his amours, but decidedly so in his contempt for a humble and repentance-demanding faith. The *Athenæum* is wrong in stating that his book is withdrawn from circulation. It is only a question of a change of publisher, a private affair with which the public have nothing to do. Indeed, as the *Pall Mall* says, there is much that *cannot* and *ought not* to be suppressed. We trust Mr. Swinburne will soon give his envious detractors who cannot understand him the best rebuff, by producing something free from that too erotic admixture which has laid him open to the sneers of poetasters with not one half of his courage or inspiration.

The annual report of the Council of the Ray Society, which was founded in 1844 for the publication of works on Zoology and Botany, is this year of a most satisfactory nature. In the last four years the number of members shows a steady increase, and though losses are necessarily sustained by deaths and by occasional withdrawals from the Society, these are more than replaced by the new members joining the Society, now that its career appears to be so prosperous. At first this Society only issued one volume a year, was two or three years in arrear with its issues, and the accounts not long ago showed a large amount of debt. Now the issues for previous years are all complete, two volumes having been issued for the year 1865, whilst two for the current year (1866) have already been issued, and a third volume is now in the press. The debts of the Society have been all paid off, and the Treasurer reports a very respectable balance of cash in hand. Anyone joining the Society up to the 29th inst. is entitled to the imperial quarto work on the "Cetacea" recently issued, as well as to the important ornithological work now in the press, Nitzsch on "Pterylography," translated from the German, edited by Dr. P. L. Sclater. The Council have accepted a proposal by Mr. W. K. Parker for a work "On the Structure and Development of the Shoulder-girdle and the Sternum in the Vertebrata generally." This, which will be illustrated by thirty plates, imperial quarto, will be a very valuable contribution to science, and the Committee of the Government Grant Fund of the Royal Society has shown its high opinion of the proposed work by voting 100*l.* in aid of its execution. Other volumes in preparation are Messrs. Alder and Hancock on the "British Tunicate;" Professor Allman on the "British Corynidæ;" Mr. Bates on the "Mantidæ," with illustrations by Professor Westwood; the remaining volumes of a complete edition of the works of the late Robert Brown, edited by J. J. Bennett, F.R.S.; Messrs. Douglas and Scott on the "British Hemiptera Homoptera;" Dr. Gaertner on "Hybridism in Plants" (Bastarderzeugung), translated from the German by W. Carruthers, F.L.S.; Dr. M'Intosh on the "British Annelids;" Dr. Masters on "Vegetable Teratology;" Mr. Andrew Murray on the "Coniferæ;" and a Synopsis of the Fauna and Flora of Palestine, by the Rev. H. B. Tristram, F.L.S.

A correspondent of the *Pall Mall*, writing about the collision between the Bruiser and the Haswell, says: "Considering the character of the catastrophe, and the short time that was allowed the passengers to save themselves, it is *somewhat* providential that the loss of life was not greater." What meaning can be attached to the words "*somewhat* providential?" Are we to understand the Deity had not quite made up His mind to interfere? or that He paused in the middle of His operations? Perhaps the real explanation is that the mind of the writer is in a transitional state, and that he could not quite make up his own mind whether he should attribute the good fortune of a few to Providence or to Chance!

Mr. Arthur a'Beckett has a new work in the press entitled "Our Roving Commissioner," consisting of a number of light sketches upon various subjects.

The twenty-seventh annual report of the Deputy-Keeper of the Public Records has just been published, giving an account of the business done and the improvements effected at the new Record Office, in Fetter Lane, during the year 1865. 3,773 persons transacted business in the Legal Search Office, paying fees to the amount of 861*l.* 13s. The number of literary inquirers was 175, and they inspected 12,677 documents, exclusive of calendars, indexes, and printed books of reference. The work of producing facsimiles of records and documents by the process of photozincography was carried on at the Ordnance Survey, Southampton, under the direction of Mr. William Basevi Sanders. The first part, comprising documents from the Conquest to the reign of Henry VII., was published in March, 1865, and the second part, consisting of documents of the reigns of Henry VIII. and Edward VI., was nearly ready for publication at the close of the year. The third part, including the reigns of Mary and Elizabeth, has been commenced. A similar collection of the national documents of Scotland is in progress. On the 26th of July Dr. Robertson, of the General Register House, Edinburgh, arrived at Southampton, and handed over to the custody of Mr. Sanders a portion of the documents selected from the national manuscripts of Scotland. By the end of September the whole of these were photographed. The plan adopted for the Scotch records is peculiar. Each copy scales exactly with the original. Many of the Scotch MSS. were so large that, in order to copy them in the manner decided upon, without any reduction of size, it became necessary to photograph them in sections, as many as seven separate negatives having to be taken of the same record in one or two instances. The size of the documents prevented their being placed in the glass frame, and it was consequently impossible to prevent the parchment from temporarily shrinking under the sun, and so rendering the size of the letters smaller in each succeeding negative. Fortunately, the weather was exceptionally fine, and the exposure consequently so short that the operators were enabled to get the negatives before the sun and wind had had time to distort or shake the letters. The next step was to prepare the transfer, and, in order to do this, it was first necessary to take a separate carbon print of each of the sections in which the original had been photographed, to cut off the surplus portions, and to piece the remainder together with such nicety that no division should be visible. The first instrument copied in this way was the Bull of Pope Honorius III. to King Alexander II., conferring privileges on the Church and Kingdom of Scotland, dated from the Lateran, November 21, 1218. It was determined that a calendar should be drawn up of the valuable *Carew Papers* in the Lambeth Library, including the six volumes which once formed a portion of the Laud MSS. The documents in this collection emanate from the highest authorities, and consist in many cases of narratives of the proceedings of the Irish Deputies, which were intended for no eyes but their own and those of the Home Government. The task of calendaring this important collection has been intrusted to the Rev. J. S. Brewer, Professor of English Literature at King's College, London, and Mr. William Bullen. The question of binding that priceless relic of antiquity, *Domesday Book*, in a manner worthy of the nation, is still under consideration.

The organization of a scheme for collecting agricultural statistics throughout France, which we referred to some months back, on the occasion of the appointment of the Imperial Commission, is now completed. The questions, to the number of 161, have been decided upon, and the forms have been printed and distributed to the Prefects of Departments. For the purposes of

the inquiry, twenty-eight divisions have been formed, to each of which a sub-commission has been appointed to collect and arrange the information, part of which will be obtained orally. The questions have been chosen with much care, and the statistics collected will doubtless prove of the highest value. They are arranged under four heads, the first of which relates to the general conditions of agricultural operations, including the methods of cultivation, value of land, rents, amount of capital necessary for farming on the system which prevails in the locality, wages, extent to which machinery has been introduced, and its effect upon the rate of wages, &c. The second division relates to the special processes of agriculture, and contains questions on the methods of cultivation in use and their relative advantages, the nature and extent of the irrigation and drainage works carried out, enclosures, the quantity of grain, fruit, wine, oil, sugar, silk, &c., produced, the proportion between the cultivated and waste land of the district, the breeding of cattle, &c. The third division relates to the roads, canals, rivers and railways of the district, and generally to the facilities and cost of intercommunication. The fourth and last division refers solely to the legislative enactments in force, and the effect of foreign treaties on the supply and price of agricultural commodities. Our statistic-loving neighbours will doubtless be enabled to draw some very interesting conclusions from the mass of facts thus accumulated. We venture to predict that one fact will be brought out very clearly—viz., the small influence which the introduction of machinery has exercised upon the art of agriculture. Whether agricultural operations, from their very nature, are not susceptible of advancement by machinery, or whether the agricultural mind is too strongly attached to the old systems to make any innovations, is difficult to determine. Perhaps, however, the report of the Imperial Commission will throw some light upon the subject.

THE following doggrel, which occurs on the title-page of a longer effort of doggrel called "England's Free Slavery," illustrates the prevalence of Mr. D'Gruyther's notions about the personal power of the Queen :—

O Queen! good Queen! *didst thou direct*
The policy of Government,
Thou wouldst not have these poor hearts wrecked,—
A husbandhood and wifehood rent.
No! rather thou wouldst soothe their cares,
Wouldst venerate their silver hairs.

What these good people want is, in fact, an absolute despotism.

AMONGST the facetiæ of printing may be enumerated this mode of expressing the date 1466 :—

Vng trappier et quatre croissans
Par six croix avec sy nains faire
Vous feront estre congnoissans
Sans faillir de mon miliare.

A NOVEL fog-signal has recently been erected on the island of Ushant, near Brest, for the purpose of warning sailors of the proximity of the land during foggy weather. The apparatus consists of a large trumpet fixed vertically on a reservoir of compressed air, supplied by a blowing engine worked by two horses. The bell of the trumpet is bent at right angles, and can be moved horizontally through an angle of 180°, so as to throw the sound in any direction. Communication may be made with the reservoir by means of a stop cock, so that a continuous or intermittent sound may be produced at pleasure. The sound is so powerful that it may be heard at a distance of three or four nautical miles. It is stated that the authorities intend placing these trumpets on several of the most dangerous parts of the French coast.

M. A. de Solomé completed last week at Osborne a crayon portrait of His Royal Highness the Duke of Edinburgh, which is shortly to be engraved by Mr. William Holl, and published by Messrs. Griffin and Co., of Portsea.

THE "Public School Latin Primer," which has been submitted to all the head-masters of England, and which "must be viewed as the final result of much consultation," has at length been published by Messrs. Longmans. At the first glance we miss our old friends the "As in præsenti," and "Propria quæ Maribus," instead of which last we read—

Nouns denoting males in *ă*
Are by meaning masculĭnă;
And added to the males must be
Hădrĭă, *the Hadriatic Sea.*

The use of rhythm or rhyme has, therefore, not been discarded. Further criticism must be postponed for the present. Meanwhile, companion books to the Primer are in active preparation, to be called "Subsidia Primaria."

WE are glad to hear that the Cambridge Shakespere, edited by Messrs. W. Aldis Wright and E. Clark, approaches completion. Fifty-one sonnets are already in type.

WE call attention to an article on some fresh traces of Chaucer by a sound and accurate scholar—Mr. E. A. Bond, of the Manuscript Department in the British Museum—which appeared in the *Fortnightly Review* of the 15th inst.

WE regret to record the death of Mr. R. Nugent Dunbar at Paris. He was author of "The Nuptials of Barcelona, and "The Beauties of Tropical Scenery." A third edition of this last was published only a short time ago.

THE French Commission, which is now engaged upon an examination of the various patterns of breech-loading rifles, made an interesting experiment on the 17th instant, at the Camp of Châlons. A company of infantry, consisting of eighty men, was placed in front of a target, representing a squadron of cavalry, at a distance of 430 yards. In the rear, and to the right of the infantry, a squadron of cavalry had been posted, also at a distance of 430 yards. At a given signal the infantry commenced firing, and the cavalry started off at a gallop, the 430 yards being accomplished in the short space of 32 seconds. During this period 320 shots had been fired by the infantry, and 169, or more than one half, had struck the target. It will be seen that the conditions of the experiment are exactly those of a square, when charged by cavalry. The experiment was repeated, with the same results. The arm used was that known as the Chassepot rifle, which is receiving considerable attention just now from the French authorities. The experiment strikes us as being particularly interesting, inasmuch as it shows the rapidity of firing, and also the speed of cavalry when advancing at the charge.

A VERY interesting report upon the documents in the public libraries of Venice has just appeared. It is printed in the form of a letter from Mr. T. Duffus Hardy, the Deputy Keeper of the Public Records, to the Master of the Rolls. It contains among other matters, a list of documents relating to the divorce of Henry VIII., a list of letters relating to Cardinal Pole, and a list of letters relating to James Stuart. "During his residence in Jersey, about the year 1646," says Mr. Hardy, "it seems that Prince Charles (afterwards Charles II.) engaged the affections of a young lady whose name does not appear. She is said to have belonged to the family of the noble House of Mar." By her he had a son, as he says, "plustost par fragilité de nostre première jeunesse que par malice." And this son was the James Stuart to whom the letters refer, unless indeed this person was an impostor. Mr. Hardy prints the will of this Giacomo Stuardo in an appendix. It is a curious document, and is thus endorsed, "The last will of the late impostor at Naples, who at first pretended himselfe to be a naturall sonne of the King of England, 1669."

A NIECE of Oliver Goldsmith is said to be still living in America, at West Hoboken, N. J. Mrs. Hanson was the third child of his younger brother. Her husband was ruined by the enfranchisement of the slaves in Jamaica, and her grandson was killed in the late American War. The rector of her parish applies through the American papers for assistance for this old, blind, crippled, and indigent lady. Mrs. Hanson is a British subject. Surely, if the case was brought before the proper authorities, something might be allowed her from the Civil List.

THE work of M. Louis Lartet on the Caves of Spain, fourteen of which he has examined, has just been published. M. Roulin declares that on his travels with M. Brongniart he has seen potters diligently engaged in fabricating "antique" pottery.

A PICTURE of the Battle of Gettysburg is to be painted on a very large scale on the wall of the new extension to the Capitol at Harrisburg, Philadelphia State, by Mr. Rothermel, for $25,000. It is to have a supplementary border in the compartments of which characteristic incidents are to be introduced. The largest picture at present known is the ceiling in the Hall of Hercules at Versailles, by François Lemoine, containing 142 figures, and being 64 feet long, and 54 broad, without being divided by any architectural interruptions.

AT the sitting of the French Academy last Monday an account was read of a spectroscope invented by Father Secchi. It absorbs a very small quantity of light, and is, therefore, specially adapted for the observation of the very smallest rays which have been hitherto detected. The inventor has analyzed with it the spectrum of the light emitted by the star Antarés. It is of a red colour; the luminous bands have been resolved into bright lines, and the dark ones are chequered with light and dark lines, so there is no black foundation.

MESSRS. MASTERS will publish this week "Selections New and Old," with a preface from the pen of the Bishop of Oxford.

SIR FRANCIS HASTINGS DOYLE, Bart., is about to publish in a collective form his contributions in verse to the *Cornhill Magazine*, *Once a Week*, the *Shilling Magazine*, &c.

Mr. G. A. SALA'S papers on "The Streets of the World," are to be renewed in Miss Braddon's new magazine, the *Belgravian*.

THE third part of the "Reliquiæ Aquitanicæ," by MM. Lartet and Christy has just been published. It contains a sketch-map of a part of the Valley of the Vézère, and six plates of flints and objects of art from the caves of the Dordogne.

THE Professorship of Moral Philosophy in the University of Cambridge is vacant by the death of the Rev. John Grote, which took place at Trumpington, of which he was vicar, on Tuesday. Mr. Grote was a Senior Fellow of Trinity College. His predecessor in the professorship was the late Master of Trinity, who resigned it in 1855.

WE cannot help transcribing the following from the *Round Table* :—

UNDER THE SEA.—JULY 28, 1866.

Lo! a sudden message flashes 'neath the billow's foamy crest.
From the flowery meads of England to the Empire of the West.
Doth it bring a record gory of the battle's dire increase?
Nay, it tells no tale of slaughter, but a whisper soft of peace.
Lo! the blessed Christ hath spoken. As he saith, so let it be;
We accept the happy omen as it flashes through the sea.
Flaunt the flags upon the steeples! let the bell's loud voice go forth
In a peal of deep-toned triumph to the East, West, South, and North!
For the greatness and the glory of our triumph grandly won,
Where the mighty waves Atlantic flash and sparkle in the sun
Shall we grovel in our baseness, like the vile worm in the sod,
With the mighty truths of science stretching out their hands to God?
No! the light upon our foreheads grows and brightens to a star,
With a broad and regal glory through the future flashing far!
Till the fields no more shall groan beneath red harvests of the slain,
And the mighty mark of progress shall efface the brand of Cain.
Hence shall rise the suns which ripen; hence shall spring the lights which roll
All the weary mists of error from the soaring human soul.
As a pledge of truth and wisdom to a broader bound increased
Comes this mighty day-star flashing from the confines of the East.
Yea, we hold it as a foretaste of the glory yet to be
When the growing strength of knowledge shall have set the nations free;
And the soaring flight of freedom shall have found a broader wing,
Never more to droop and falter at the mandate of a king.
O, my brothers!—speed the knowledge till it spread from shore to shore,
Till earth's mighty mystic forces feed no more the cannon's roar;
Till the years be crowned with plenty, till the corn and wine increase,
And the wings of Time sweep grandly to an age of perfect peace.
In the misty unknown future, in the swiftly-coming years,
Where *our* toilsome slow fruition all the glowing landscape cheers,
Loud methinks I hear them shouting in a newer, riper age,
When the mighty march of progress shall have reaped its heritage:
"Glory to the great dead workers! In the van they fighting fell;
Gallant pioneers of progress, oh, they waged the battle well!
Take new heart, O weary toilers; from these records of the past;
For our present age is mellow with the fruitage of the last!"
Thus your triumphs, mighty thinkers, in the future shall be sung,
Echoed in the newer language *of a universal tongue.*
When no monarch's throne is guarded by the bay'net's steely ring,
But the hearts of grateful people shall protect the crowned king;
When a universal wisdom like a mighty ocean rolls,
From the heats of the Equator to the confines of the Poles.
O Columbia! O mine England! Anglo-Saxon Fatherland!
Lo! the daughter to the mother stretches forth her jewelled hand.
Henceforth be our feuds and factions buried in a common grave;
Be our only feud to conquer newer triumphs from the wave—
And to conquer newer glories, for a race supremely blest,
Till a reign of peace and plenty crown the East and crown the West;
Sweeping onward from the rising to the setting of the sun,
Till we clench a mighty *Union* of our peoples, two in one.
To thy white cliffs, happy England, rolls the greeting of the free,
As the fire electric flashes through the deeps from sea to sea!

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